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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 11, NUMBER 11
JUNE 1, 1978

W78-04701 -- W78-05200

The Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
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07 RESOURCES DATA
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09 MANPOWER, GRANTS, AND FACILITIES
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10 SCIENTIFIC AND TECHNICAL INFORMATION
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

COMPUTATION OF INFILTRATION FOR UNSTEADY UNINTERRUPTED HIGH RAINFALL,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 2B.
W78-04715

INTERSTITIAL WATER COMPONENTS AND EXCHANGE ACROSS THE WATER SEDIMENT INTERFACE OF WESTERN LAKE SUPERIOR,
For primary bibliographic entry see Field 5C.
W78-04769

MODELING DAILY PRECIPITATION OCCURRENCE PROCESS WITH MARKOV CHAIN,
National Weather Service, Silver Spring, MD. Office of Hydrology.
For primary bibliographic entry see Field 2B.
W78-04827

PARAMETER ESTIMATION OF THE GREEN AND AMPT INFILTRATION EQUATION,
Agricultural Research Service, Boise, ID. Northwest Watershed Research Center.
For primary bibliographic entry see Field 2G.
W78-04836

HYDROLOGY - 1976,
Geological Survey, Reston, VA. Water Resources Div.
L. A. Heindl.
Encyclopedia Britannica Book of the Year Earth Sciences, p 292-295, 1977.

Descriptors: *Hydrology, *Surface waters, *Groundwater, *Reviews, Floods, Droughts, Streamflow, Regulated flow, Sediment transport, Groundwater resources, Pumping, Drawdown, Land subsidence, Groundwater recharge, Injection wells, Water pollution sources, Water pollution control, Water supply, Water utilization.

This article reviews some of the catastrophic-hydrological events that have occurred in different parts of the world and methods of managing our water resources. (Woodard-USGS)
W78-04864

COMPUTER PROGRAMMING FOR MAXIMUM MODELING INFORMATION TRANSFER,
Booker Associates, Inc., Lexington, KY.
For primary bibliographic entry see Field 2E.
W78-05025

2B. Precipitation

COMPUTATION OF INFILTRATION FOR UNSTEADY UNINTERRUPTED HIGH RAINFALL,
Colorado State Univ., Fort Collins. Engineering Research Center.
H. J. Morel-Seytoux, T. A. Pick, and T. Jonch-Clausen.
Journal of Hydrology, Vol 35, No 3/4, p 221-234, November 1977. 7 fig, 1 tab, 21 ref. OWRT B-144-COLO(5), 14-34-0001-6064.

Descriptors: *Infiltration, *Rainfall, *Model studies, Mathematical models, Precipitation(Atmospheric), Ponding, Runoff, Equations, Formulas, Hydrographs, Hydraulic conductivity, Precipitation intensity, Precipitation excess, Soils, Soil water movement, Percolation, Permeability, Soil properties, Rainfall patterns.

The use of previously proposed formulas for rainfall infiltration demonstrated the sensitivity of the response hydrographs to the rainfall pattern. For steady rainfall, the proposed formulas of ponding time and of infiltration rate after ponding were verified by comparison with experimental data. For unsteady rainfall, inspection of the formulas indicated that they may be in serious error for low-intensity rains of long duration. (Sims-ISWS)
W78-04715

MODELING DAILY PRECIPITATION OCCURRENCE PROCESS WITH MARKOV CHAIN,
National Weather Service, Silver Spring, MD. Office of Hydrology.
E. H. Chin.
Water Resources Research, Vol 13, No 6, p949-956, December 1977. 2 fig, 6 tab, 7 ref.

Descriptors: *Precipitation(Atmospheric), *Model studies, *Markov process, *United States, Mathematical models, Summer, Winter, Statistics, Statistical models, Analytical techniques, Rainfall, Snow fall, Meteorology, Climatology, Daily precipitation.

Daily precipitation records for 25 years at more than 100 stations in the conterminous United States were analyzed. The order of the Markov chain representing the conditional dependence of precipitation occurrences at each station was studied. This was done by using a decision procedure based on an extension of the principle of maximum likelihood. A loss function composed of a log-likelihood ratio term and a degree-of-freedom term was used as the decision criterion. Among several competing Markov orders, the on that minimizes this loss function was selected. The results showed that the order of conditional dependence of daily precipitation occurrences depends on the season and geographical location. There exists a prevalence of first-order conditional dependence in summer and higher-order conditional dependence in winter. An explanation based on meteorology was proposed. In both seasons, there are areas where the Markov order deviates from the prevalent patterss. If the record length is too short (much less than 1000 days), there is a tendency for a low-order chain to be misrepresented as the proper model. A specific example in which a third-order model is required to depict the precipitation occurrence in winter also was given in some detail. Therefore, the proper Markov order describing the daily precipitation occurrence process has to be determined and cannot be assumed a priori. The common practice of assuming that the Markov order is always 1 is unjustified. (Sims-ISWS)
W78-04827

HURRICANE WIND AND WAVE FORECASTING TECHNIQUES,
Hawaii Univ., Honolulu. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 2L.
W78-04968

MARINE CLIMATOLOGY OF THE GULF OF ALASKA, THE BERING AND BEAUFORT SEAS,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center.
J. L. Wise.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977. Vol 15. Transport, p 279-392, March 1977. 3 fig. 03-5-022-56.

Descriptors: *Baseline studies, *Resources development, Climatology, Coasts, Alaska, *Outer Continental Shelf, *Gulf of Alaska, *Bering Sea, *Beaufort Sea, Oil and gas development.

All available climatological data for the Gulf of Alaska, Bering and Beaufort Seas are used in determining and publishing the present state of knowledge in this area. An atlas will be produced and published for each of the three areas. Summarized data for period of record for coastal stations will also be included. Specific objectives are to present information on temperature, precipitation, wind and how they relate to such things as cloud cover, wave heights, and visibility (fog). Storm tracks and frequencies, storm surges and coastal flooding are part of the presentation. Such things as potential superstructure icing, tides, surface currents, immersion hypothermia and topography of both land and sea will be included. Extremely severe weather conditions can and do occur over all of the continental shelf areas of Alaska as well as coastal and interior portions. This makes it important that the intensities and durations of storms are known and available for use in planning, design and actual operations. (Sinha-OEIS)
W78-04992

CLIMATIC ATLAS OF THE OUTER CONTINENTAL SHELF WATERS AND COASTAL REGIONS OF ALASKA,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center; and National Climatic Center, Ashville, NC.
J. L. Wise, H. W. Searby, W. A. Brower, Jr., H. F. Diaz, and A. S. Prechtel.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977. Vol 15. Transport, p 393-405, March 1977. 5 fig.

Descriptors: *Baseline studies, *Resources development, Climatology, Climatic data, Alaska, Coasts, *Outer Continental Shelf, Climatic atlases, Oil and gas development, Petroleum development.

This study is to establish descriptive climatology and data analysis of surface marine and atmospheric parameters for the outer continental shelf waters and coastal regions of Alaska. It is to serve as an environmental guide in assessing potential impact of oil and gas exploration and development and in influencing leasing and operation regulations and design of monitoring programs to permit resource development with the necessary environmental protection. The climatic data in each atlas are to be represented monthly, by isopleths on charts and by statistical graphs. Each atlas will be 11 inch x 11 inch in size and contain some 480 pages, of which 228 will be 3-color charts, each page having an opposing page of graphs for the particular set of coastal stations and marine areas pertinent to each atlas volume. The remaining pages will consist of statistical tables and a descriptive narrative of the atlas content. (Sinha-OEIS)
W78-04993

COASTAL METEOROLOGY OF THE ALASKAN ARCTIC COAST,
Washington Univ., Seattle. Polar Research Center.
F. Carsey.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977. Vol 15. Transport, p 538-578, March 1977. 16 fig, 3 append. 03-5-022-671011.

Descriptors: *Baseline studies, *Resources development, *Water pollution, *Winds, *Diffusion, Sea ice, Arctic Ocean, Alaska, Pollutants, Oil spills, Tides, Currents(Water), *Outer Continental Shelf, Pollutant transport, Prudhoe Bay(AK).

This study was designed to examine actual winds in the Prudhoe Bay area, to compare these winds with those predicted by the National Weather Ser-

vice analysis and to model local or mesoscale phenomena which create departures of measured from predicted winds. The winds of interest in this work are those which produce significant surface currents and tides in the Prudhoe Bay area. Therefore, these winds will, when taken with other current-producing mechanisms, describe the mean trajectory and lateral diffusion of oil on open water and, to a certain extent, oil under sea ice. The magnitude of these flow terms will enable determination of the size and extent of an oil slick and its likelihood of impacting the biota of specific regions and depths. In order to accomplish this entire task, other research, such as into the behavior of spilled oil with time in arctic conditions, must be performed. (Sinha-OEIS)
W78-04997

RADARSCOPE INTERPRETATION: SEVERE THUNDERSTORMS AND TORNADOES,
Air Weather Service, Scott AFB, IL.
R. C. Whiton, and R. E. Hamilton.
Report No. AWS-TR-76-266, September, 1976. 23 p, 12 fig, 4 tab, 48 ref. Supercedes AWS Technical Report 243, On the Use of Radar in Identifying Tornadoes and Severe Thunderstorms: A Diagnostic Guide for Radar-Scope Interpretation, May, 1971.

Descriptors: *Meteorology, *Radar, *Weather forecasting, *Meteorological data, Thunderstorms, Tornadoes, Hail, Precipitation(Atmospheric), Warning systems, Weather, Weather patterns, Radar detection, Meteorological radar, Radar echo signatures, X-band radar, S-band radar, C band radar.

This report contains material taken from the available literature on the identification of severe thunderstorms, hail, and tornadoes from radar echoes. Radar echo signatures indicating severe weather are consolidated for geographical areas and weather types to afford the radar meteorological easy access to the findings of several investigators in the weather radar field. Information concerning X-band, S-band, and C-band radars is presented. Also included are threshold values, above which severe weather is expected, and an evaluation table designed to assist each installation in determining their particular need for warning information by establishing Probability of Detection, False Alarm Ratio, and Critical Success Index threshold values for each radar techniques. (Seip-IPA)
W78-05006

WATER-QUALITY AND RAINFALL DATA COLLECTED WITH AUTOMATED FIELD STATION, FORT MCCLELLAN, ALABAMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Mobility and Environmental Systems Lab.
For primary bibliographic entry see Field 5A.
W78-05010

RESUSPENSION OF PLUTONIUM FROM CONTAMINATED LAND SURFACES: METEOROLOGICAL FACTORS,
Environmental Monitoring and Support Lab., Las Vegas, NV. Office of Research and Development.
For primary bibliographic entry see Field 5B.
W78-05056

2C. Snow, Ice, and Frost

EVAPORATION IN HIGH LATITUDES,
McMaster Univ., Hamilton (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 2D.
W78-04823

TURBULENT DIFFUSION IN CHANNELS WITH A SURFACE COVER,
University of Science and Technology, Kumasi (Ghana), Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-04848

STUDY OF CLIMATIC EFFECTS ON FAST ICE EXTENT AND ITS SEASONAL DECAY ALONG THE BEAUFORT-CHUKCHI COASTS,
Colorado Univ., Boulder. Inst. of Arctic and Alpine Research.
For primary bibliographic entry see Field 5B.
W78-04984

MECHANICS OF ORIGIN OF PRESSURE RIDGES, SHEAR RIDGES AND HUMMOCK FIELDS IN LANDFAST ICE,
Alaska Univ., College. Geophysical Inst.
L. H. Shapiro, H. F. Bates, and W. D. Harrison.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 15. Transport, p 1-41, March 1977. 7 fig, 12 ref. 03-5-022-55.

Descriptors: *Baseline studies, *Resources development, *Ice, Deformation, Bathymetry, Alaska, Outer Continental Shelf, Landfast ice, Pressure ridges, Shear ridges, Pollutant transport.

The results of three studies in progress are summarized. The first of these involves the formation of ridges along the shore at Barrow in the late Spring of 1975 and 1976. The second study is based upon observations of vibrations of ice sheets, with amplitudes of a few centimeters and periods of about 10 minutes, in apparent association with increasing stress levels in the ice. Finally, bathymetry survey of the coast near Barrow was done during the past year, and the results are presented. The distribution of gouges in the sea floor was studied, and a change in the density of these at a depth of 30 feet was identified. In addition, gouges were found to depths of 120 feet, the limit of the survey. (Sinha-OEIS)
W78-04985

MORPHOLOGY OF BEAUFORT, CHUKCHI AND BERING SEAS NEAR SHORE ICE CONDITIONS BY MEANS OF SATELLITE AND AERIAL REMOTE SENSING,
Alaska Univ., College. Geophysical Inst.
W. J. Stringer, S. A. Barrett, N. Balvin, and D. Thomson.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 15. Transport, p 42-150, March 1977. 9 fig. 03-5-022-55.

Descriptors: *Baseline studies, *Resources development, *Environmental effects, *Morphology, Ice, *Remote sensing, Hazards, Sea ice, Alaska, Outer Continental Shelf, Oil and gas resources, Environmental conditions, Petroleum development.

The objective of this research was to develop a morphology of near shore ice along the Beaufort, Chukchi and Bering coasts of Alaska, and identify those features which may represent hazards imposed by ice conditions on OCS oil and gas development. The general conclusion is that near shore sea ice behavorial patterns are similar from year to year thereby yielding some predictability in terms of offshore sea ice hazards to oil and gas development. The implications are that geographical zones of different design and construction criteria can be established in the offshore areas taking into consideration the probability of damage to the structure by adverse ice conditions and the relative risk imposed to the adjacent ecosystems. (Sinha-OEIS)
W78-04986

EXPERIMENTAL MEASUREMENTS OF SEA ICE FAILURE STRESSES NEAR GROUNDED STRUCTURES,
Alaska Univ., College. Geophysical Inst.
W. M. Sackinger, and R. D. Nelson.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 15. Transport, p 151-179, March 1977. 14 fig, 12 ref. 03-05-022-55.

Descriptors: *Baseline studies, *Resources development, *Stress analysis, *Sea ice, Alaska, Deformation, Hazards, *Outer Continental Shelf, Ice sheets, Environmental conditions, Petroleum development, Oil and gas resources, Pollutant transport.

The objectives of this study were to measure, in-situ, the stresses generated in a sea ice sheet as it fails in the vicinity of a static obstacle and the rate of approach of the ice sheet during this process. The stresses in a floe of multi-year ice near a grounded floe-island were studied for 60 hours starting April 21, 1976. The instrumented floe was subjected to many compressive stress pulses during the first 26 hours of the experiment. The highest stress pulse recorded on the strip charts was 250 p.s.i. compression. The length of this pulse was not adequately resolved by the recorder, but probably lay between 0.33 seconds and 32 seconds. It did not cause destruction of the ice at the transducer. A second installation in annual ice beyond a grounded pressure ridge in 20 meter water depth showed a tensile stress buildup to 100 p.s.i. which was followed by crack formation adjacent to the transducer. Offshore structures subjected to multi-year ice floes must withstand ice stresses greater than 250 p.s.i. Impulse loading should be expected. (Sinha-OEIS)
W78-04987

BEAUFORT SEA, SHUKCHI SEA, AND BERING STRAIT BASELINE ICE STUDY,
Alaska Univ., College.
W. R. Hunt, and C. M. Naske.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 15. Transport, p 180-191, March 1977. 03-5-022-55.

Descriptors: *Baseline studies, *Resources development, *Sea ice, Maps, Navigation, Alaska, *Outer Continental Shelf, *Ice navigation, *Beaufort Sea, *Chukchi Sea, Bering Strait.

A number of maps which show the historic variations in ice conditions over a 100 year period were completed. These maps were presented at the February 1977, conference of principal investigators in Barrow, Alaska. They will be utilized in the preliminary report which the Arctic Project Office is preparing. The data was extracted from ship logs of whaling vessels, U.S. Revenue Marine Service and U.S. Coast Guard vessels as well as trading ships. A sample of ice data that lends itself to chronological narrative rather than carographic representation is included with this report. (Sinha-OEIS)
W78-04988

DEVELOPMENT OF HARDWARE AND PROCEDURES FOR IN SITU MEASUREMENT OF CREEP IN SEA ICE,
Alaska Univ., College. Geophysical Inst.
L. H. Shapiro, R. D. Nelson, and E. R. Hoskins.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 15. Transport, p 192-241, March 1977. 14 fig, 1 tab, 13 ref. 03-5-022-55.

Descriptors: *Baseline studies, *Resources development, *Mechanical properties, *Sea ice, Construction, Creep, Arctic Ocean, Alaska, *Outer Continental Shelf, Petroleum development, In-situ measurement, Offshore structures.

The procedures and hardware required for in-situ measurement of the mechanical properties of sea ice were developed and tested and a program of such measurements was conducted. In addition, the results of the extensive series of laboratory tests of sea ice in creep and at constant loading rates are being reevaluated. Any permanent or semi-permanent structure off the Arctic Coast of Alaska must contend with the hazard that sea ice presents to its stability. In order to properly design such installations it is necessary that reliable values of the mechanical properties of the ice be available both for establishing the design of the structure, and for the evaluation of that design by public agencies. In additon, significant savings in cost of construction can be realized if less conservative safety factors can be utilized. (Sinha-OEIS)
W78-04989

SNOW MAPPING, AND LAND USE STUDIES IN SWITZERLAND,
Zurich Univ. (Switzerland). Dept of Geography.
H. Haefner.
Available from the National Technical Information Service, Springfield, VA 22161 as N77-21504, Price codes: A04 in paper copy, A01 in microfiche. Final Report No. 29760, January 1977. 53 p, 26 fig.

Descriptors: *Snow, *Runoff, *Snowmelt, *Runoff forecasting, *Snow survey, Areal mapping, Satellites, Human population, Density, *Land use, *Switzerland, Data collections, *LANDSAT.

A project was conducted to develop an integrated classification system to operationally map and measure dynamic surface features in Switzerland (in particular snow and land use) by means of multitemporal digital satellite (LANDSAT) data. The application of these data should lead to better surface water runoff predictions and provide a better surface water runoff predictions and provide a better data base for hydrologic balance, population, settlement and planning purposes. The system developed was based on a supervised classification method using various algorithms and representation of the results in maplike form on color film with a photomation system. Snow mapping in high mountain terrain can be achieved independently of relief and shadow effects, sun angle, snow type, surface conditions, etc. The transition zone between the totally snow-covered and the totally snowfree areas, which is of specific interest in the melting process and for runoff predictions, was analyzed in detail regarding location, extent and vertical dimensions, with an accuracy of approximately 94%. Land use categories considered and analyzed included water, agriculture, forest, and built-hup areas. Further study is indicated to determine population density changes and fringe zones as well as snow movement and changes. (Seip-IPA)
W78-05012

2D. Evaporation and Transpiration

EVAPORATION IN HIGH LATITUDES,
McMaster Univ., Hamilton (Ontario). Dept. of Geography.
W. R. Rouse, P. F. Mills, and R. B. Stewart.
Water Resources Research, Vol. 13, No. 6, p 909-914, December 1977. 5 fig, 3 tab, 9 ref.

Descriptors: *Evaporation, *Tundra, *Subarctic, *Canada, Equilibrium, Vegetation, Radiation, Air temperature, Model studies, Douglas fir trees, *High latitudes, *Hudson Bay Coast, *Lake Athabasca(Canada), Energy balance.

A simplified form of the equilibrium model of evaporation predicted evaporation from six subarctic and tundra surfaces with an accuracy of 8%. Input data to the model were net radiation, screen air temperature, and an evaporability factor characteristic of the surface. The radiation and energy balances of the six surfaces were compared. The tundra sites were located adjacent to one another near the Hudson Bay coast. The upland lichen heath was covered in a lichen and shrub vegetation varying from 30 to 70 mm in mat thickness. It was extremely flat, and for measurement purposes had an unlimited fetch in all directions. The subarctic woodland and burn sites were located north of Lake Athabasca. The arboreal vegetation in the mature lichen woodland was exclusively black spruce, averaging 14 m in height. Each tree was an average of 3 m from its nearest neighbor. The ground flora was dominated by various species of non-transpiring lichen. The mature lichen woodland had the highest evaporation of any of the upland surfaces. The lichen heath had similar evaporation rates and displayed a strong surface resistance to evaporation. (Roberts-ISWS)
W78-04823

EVAPORATION FROM THE WET CANOPY OF A PINE FOREST,
Institute of Hydrology, Wallingford (England).
J. B. Stewart.
Water Resources Research, Vol. 13, No. 6, p 915-921, December 1977. 2 fig, 1 tab, 28 ref.

Descriptors: *Evaporation, *Forests, *Canopy, On-site investigations, Data collections, On-site data collections, Evapotranspiration, Trees, Pine trees, Precipitation(Atmospheric), Rainfall, Wetting, Solar radiation, Heat transfer, Humidity, Measurement, Data processing, Mathematical models, Watersheds(Basins).

Measurements of the energy budget of a pine forest were made on 70 dyas when the canopy was wet. Out of 245 20-min periods when the canopy was wholly wet, 173 were occasions when the latent heat flux exceeded the net radiation, the additional energy being provided by a downward flux of sensible heat. Under the same level of radiation, the average rate of evaporation of intercepted precipitation was found to be three times the average rate of transpiration, so that the loss by evaporation of intercepted precipitation is only partly compensated by the suppression of transpiration. It was concluded that reliable estimates of the water resources of forested areas require a separate calculation of the interception and transpiration components of the total evaporation loss. (Sims-ISWS)
W78-04824

MODELING SOIL WATER MOVEMENT INTO PLANT ROOTS,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
D. C. Slack, C. T. Haan, and L. G. Wells.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 5, p 919-927, 933, September-October 1977. 7 fig, 1 tab, 48 ref.

Descriptors: *Soil water movement, *Soil-water-plant relationships, *Evapotranspiration, Root systems, Leaves, Plant physiology, *Corn(Field), Laboratory tests, Model studies, Mathematical models, Soil water, Soil properties, Hydraulic conductivity, Evaporation, Agriculture.

A mathematical model was developed which describes uptake of water by plant roots as a function of leaf and soi water potentials. The model was used to estimate transpiration from corn grown in a controlled environment under soil drying conditions. The model predicted daily transpiration quite well for the period modeled. (Sims-ISWS)
W78-04843

QUANTITY AND QUALITY CONSIDERATIONS FOR WATER USE EFFICIENCY IN IRRIGATION,
Texas Tech Univ., Lubbock. Dept. of Plant and Soil Science; and Texas Tech Univ., Lubbock. Dept. of Biological Sciences.
For primary bibliographic entry see Field 3F.
W78-05054

AIR TEMPERATURE AND VAPOR PRESSURE CHANGES CAUSED BY SPRINKLER IRRIGATION,
Agricultural Research Service, Kimberly, ID. Snake River Conservation Research Center.
R. A. Kohl, and J. L. Wright.
Agron J. 66(1), p 85-88, 1974.

Descriptors: *Air temperature, Cooling, *Evaporation, Growth rates, Irrigation, Plant growth, *Sprinkler irrigation, *Vapor pressure, Water loss.

The downwind effect of evaporation from sprinkler spray was studied in the field to determine if air temperature and vapor pressure were changed enough to influence plant growth and water use. Wet-bulb and dry-bulb temperature profiles were measured upwind and at 3-distances downwind from a sprinkler lateral before and during sprinkling. Wind-speed and direction were also measured. Air temperature generally was reduced less than 1C, and vapor pressure in the air was increased less than 0.8 mbar. This amount of change in the air temperature and humidity is not likely to be sufficient to cause any significant change in plant growth or evaporative loss of water.--Copyright 1974, Biological Abstracts, Inc.
W78-05086

2E. Streamflow and Runoff

THE SAMPLING ERROR OF STORAGE SIZE,
Monash Univ., Clayton (Australia). Dept. of Mathematics.
R. M. Phatarfod.
Water Resources Research, Vol. 13, No. 6, p 967-969, December 1977. 1 tab, 5 ref.

Descriptors: *Reservoirs, *Storage capacity, *Model studies, Mathematical models, Markov processes, Mathematics, Sampling, Distribution patterns, Flow, Discharge(Water), Lakes, *Sampling errors, Error analysis, Gamma distribution, Reservoir size.

The size of a reservoir for a given draft ratio and reliablity usually is obtained by fitting a distribution to the historical flows. Since the parameters of the inflow model are estimates obtained from data, they are subject to sampling errors. There errors are carried on and magnified when the size of the reservoir is determined. The bias and the standard error of the reservoir size were consdiered. Details were worked out for the case of the gamma input. (Sims-ISWS)
W78-04829

THE SMALL SAMPLE EXPECTATION OF POPULATION AND ADJUSTED RANGES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulics and Water Power.
Z. Sen.
Water Resources Research, Vol. 13, No. 6, p 975-980, December 1977. 2 fig, 14 ref.

Descriptors: *Hydrology, *Reservoirs, *Model studies, *Mathematical models, Synthetic hydrology, Streamflow, Storage capacity, Markov processes, Monte Carlo method, Mathematics, Statistics, Analytical techniques, Computer models, Small sample estimation, Normal independent processes, Population range, Brownian motion.

The general form of small sample expectations for population and adjusted ranges was derived by employing a methodology based on the Brownian motion. An application of the methodology to any normal and stationary process used in hydrology was performed. Moreover, the asymptotic ideal reservoir sizes for dependent processes was derived. (Sims-ISWS)
W78-04830

THE SMALL SAMPLE EXPECTATION OF RESCALED POPULATION AND RESCALED ADJUSTED RANGES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulics and Water Power.
Z. Sen.
Water Resources Research, Vol. 13, No. 6, p 981-986, December 1977. 6 fig, 10 ref, 1 append.

Descriptors: *Hydrology, *Model studies, *Mathematical models, Markov processes, Monte Carlo method, Mathematics, Equations, Streamflow, Regression analysis, Analytical techniques, Computer models, Rescaled ranges, Small sample estimation, Normal independent processes.

The expected value of the rescaled range R/S, which is a measure of long-term persistence in hydrology, was obtained analytically by making use of t distribution. The application of the model was performed for various hydrological processes. Finally, the asymptotic equivalence for expectations of the range and the rescaled range was proven. (Sims-ISWS)
W78-04831

THE LOG PEARSON TYPE 3 DISTRIBUTION: THE T-YEAR EVENT AND ITS ASYMPTOTIC STANDARD ERROR BY MAXIMUM LIKELIHOOD THEORY,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
R. Condie.
Water Resources Research, Vol. 13, No. 6, p 987-991, December 1977. 2 tab, 9 ref, 1 append.

Descriptors: *Flood frequency, *Distribution patterns, *Frequency, *Floods, *Canada, Data processing, Analytical techniques, Maximum probable flood, Rivers, Flow, Discharge(Water), Hydrology, Climatology, *Log Pearson distribution.

The maximum likelihood estimators for the three distribution parameters of a log Pearson type 3 distribution were derived from the logarithmic likelihood function, and a solution method was given. The T-year event was derived then as a function of these parameters and the standard normal deviate t. These parameters are subject to sampling variances and covariances, whereas t is not. By using the logarithmic likelihood function, the inverse dispersion matrix was derived, and hence, the variances and covariances of the parameters. Entering these in the general variance of the estimate equation of a function of three variables led to an estimate of the asymptotic standard error of estimate of the T-year event. Flood data from 37 hydrometric stations on Canadian rivers were analyzed by this method and compared with the more common moment analysis. In all cases, the maximum likelihood analysis is markedly superior in terms of the estimate of standard error of estimate, but the asymptotic nature of the result always must be borne in mind. Possible sources of bias in the maximum likelihood estimate of the T-year event were discussed. (Sims-ISWS)
W78-04832

A NOTE ON THE HURST PHENOMENON IN TURBULENT FLOW,
California Univ., San Diego, La Jolla. Dept. of Applied Mechanics and Engineering Sciences.
C. W. Van Atta, and K. N. Helland.
Water Resources Research, Vol. 13, No. 6, p 1003-1005, December 1977. 2 fig, 10 ref. ONR N00014-76-C-0702,NSF ENG76-13147.

Descriptors: *Turbulent flow, *Model studies, *Rivers, River flow, Unsteady flow, Flow, Fluctuations, Time series analysis, Analytical techniques, Hydraulics, Hydrology, *Hurst phenomenon.

Experimental observation of a long-established theoretical result for the behavior of the rescaled range was reported. Suitable dimensional scaling was found to collapse all available geophysical and laboratory data for the rescaled range in turbulent flows. (Sims-ISWS)
W78-04834

OHIO RIVER POWER CURVE REGRESSION EQUATIONS,
Missouri Univ., St. Louis. Dept. of Physics.
L. J. Lee, and B. L. Henson.
Water Resources Research, Vol 13, No 6, p 1006-1008, December 1977. 2 tab, 11 ref.

Descriptors: *Rivers, Properties, *Regression analysis, *Ohio River, *Correlation analysis, Equations, Flow, Streamflow, Discharge(Water), Slope, Depth, Width, Velocity, Statistics, Mathematics, Computer programs, *Forecasting.

By the use of a statistical computer program, power curve regression equations and correlation coefficients were developed for as many river parameters as could be quantified accurately for the Ohio River. This was done with the expectation that these equations would be useful in sorting from the many river parameters those variables that are strongly related and would aid in predicting changes that the river might undergo as a result of the manipulative behavior of man. Results indicated that the equations developed may be useful for both purposes. (Sims-ISWS)
W78-04835

COMPETENCE OF HOPE RIVER, JAMAICA: A REAPPRAISAL OF R AS A FUNCTION OF D,
University of the West Indies, Kingston (Jamaica). Dept. of Geology.
For primary bibliographic entry see Field 2J.
W78-04837

TURBULENT DIFFUSION IN CHANNELS WITH A SURFACE COVER,
University of Science and Technology, Kumasi (Ghana), Dept. of Civil Engineering.
E. O. Engmann.
Journal of Hydraulic Research, Vol. 15, No. 4, p 327-335, 1977. 4 fig, 3 tab, 5 ref.

Descriptors: *Diffusion, *Open channels, *Ice cover, *Laboratory tests, Turbulent flow, Velocity, Profiles, Distribution patterns, Mixing, Flow, Data collections, Foreign research, Open channel flow, Transverse diffusion.

The effect of a surface cover (ice-cover) on transverse spreading of a tracer released at a constant and steady rate into a turbulent channel flow was investigated. Velocity, depth, and transverse profiles of tracer concentration were obtained a four cross sections downstream of the tracer source. It was shown that the transverse diffusion coefficient for ice-cover conditions, in a straight rectangular channel, is approximately 50% smaller than the corresponding coefficients for open water conditions. However, when these coefficients are normalised with the product of shear velocity and hydraulic radius, they do not differ significantly. An expression was derived for evaluating the average transverse diffusion coefficient over a channel reach by using concentration measurements at one station downstream of tracer source. This expression was found to give good results. (Humphreys-ISWS)
W78-04848

A BRIEF INVESTIGATION OF THE SURFACE-WATER HYDROLOGY OF YEMEN ARAB REPUBLIC,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-04872

SURVEY OF FISHES, MAMMALS AND HERPETOFAUNA OF THE COLORADO RIVER IN GRAND CANYON,
Mississippi State Univ., Mississippi State.
R. D. Suttkus, G. H. Clemmer, C. Jones, and C. R. Shoop.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 718, Price codes: A04 in paper copy, A01 in microfiche. National Park Service, Grand Canyon National Park Report Series Colorado River Research Program, Final Report, Technical Report No. 5, June 1976. 48 p, 11 fig, 5 ref, 7 append.

Descriptors: *Surveys, Data collections, Fish, Suckers, Shiners, Fish barriers, Fish establishment, Fish management, *Fish populations, Discharge(Water), Basic data collections, On-site data collections, Sampling, *Arizona, *Colorado River, *Mammals, *Reptiles, National Parks, *Grand Canyon National Park, Lee's Ferry, Diamond Creek.

In a survey study conducted to obtain base-line data, eleven extensive float trips were made down the Colorado River in the period from September 1970 through mid-June 1976. Samples of fish, mammals, plants and herpetofauna were collected; species collected are listed. In addition, terrestrial surveys were made at various land sites in the region. Major results of this survey were the lack of success in obtaining a speciman of the humpback sucker, xyrauchen texanus, and the discovery of the relative scarcity of chubs of the genus Gila. Both of these outcomes have been tied to the low water temperatures caused by releases from the Grand Canyon Dam, as well as to the barrier that the dam presents to upstream movement to suitable spawning areas. (Payton-Arizona)
W78-05001

THE ROLE OF MINIMUM VARIANCE THEORY IN DEFINING THE REGIME CHARACTERISTICS OF THE LOWER NAMOI-GWIDIR DRAINAGE BASIN,
Macquarie Univ., Ryde (Australia). School of Earth Sciences.
S. J. Riley.
Water Resources Bulletin, Vol 14, No 1, p 1-11, February 1978. 1 fig, 2 tab, 16 ref.

Descriptors: *Regime, *Hydraulics, *Model studies, *Mathematical models, Channels, Rivers, Channel morphology, Flow, Velocity, Depth, Foreign countries, Slopes, Foreign research, Friction, Fluid friction, Sediments, Sediment load, Watersheds(Basins), *Namoi-Gwydir river system(Australia).

While minimum variance theory appears to offer an explanation for the hydraulic behavior and regularity among channel systems, it is not entirely successful in predicting the regime of a channel system. In the case of the Namoi-Gwydir river system, the hydraulic variables velocity, depth, width, slope, friction, and shear appear to govern the behavior and, hence, regime of the channels. The significance of sediment load in determining regime could not be assessed. (Sims-ISWS)
W78-05019

LINE SOURCE DISPERSION WITH APPLICATION TO MIXING IN RIVER CHANNELS,
Clarkson Coll. of Technology, Potsdam, NY. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5B.
W78-05021

ORDER CLASSIFICATION OF URBAN CATCHMENTS,
North Carolina Univ. at Raleigh. Water Resources Research Center.
N. S. Grigg, and T. Sriburi.
Water Resources Bulletin, Vol. 14, No. 1, p 63-71, February 1978. 5 fig, 4 tab, 6 ref.

Descriptors: *Urban drainage, *Classification, Urban hydrology, Urban runoff, Watersheds(Basins), Drainage systems, Hortons Law, Hydrology, Systematics, Sewers, Channel morphology, Tributaries, Stream order systems, Bifurcation ratio.

Stream order systems provide useful classification methods according to the number of tributaries collected. In urban catchments, sewer line order is a concept providing for the same type of classification. Horton's stream order system was used to classify sewers, beginning with the smallest lines as first order to the largest main sewer which is sixth order for two catchments studied. Average tributary area, average length and number of lines were shown as functions of order. The bifurcation ratios also were presented. They can be used for finding the number of sewer lines in the next order. The number of first order lines depend on lot size, and the bifurcation ratios vary widely. (Lee-ISWS)
W78-05022

A UNIFYING SET OF PROBABILITY TRANSFORMS FOR STOCHASTIC HYDROLOGY,
Agriculture Research Service, Athens, GA. Southeast Watershed Lab.
W. M. Snyder, W. C. Mills, and W. G. Knisel, Jr.
Water Resources Bulletin, Vol. 14, No. 1, p 83-98, February 1978. 9 fig, 3 tab, 6 ref.

Descriptors: *Synthetic hydrology, *Statistics, *Probability, Model studies, Mathematical models, Storms, Floods, Design storm, Statistical methods, Stochastic processes, Monte Carlo method, Distribution patterns, Reservoirs, Storage, Watersheds(Basins), Hydrology, Transform, Lognormal distributions, Mixed distributions, Extremes, Risk analysis.

An ordered set of probability density functions was derived from transforms of the normal distribution. Variate transforms were based on orders of exponentiation. The set of distributions included the log-normal. A partial basis for use of these functions in hydrology was demonstrated by establishing some required properties. A concept of mixed samples of zero and nonzero elements forming nonseparable sets of virtual and real elements was introduced to establish a physical lower limit of samples data independent of functional bounds. (Sims-ISWS)
W78-05023

COMPUTER PROGRAMMING FOR MAXIMUM MODELING INFORMATION TRANSFER,
Booker Associates, Inc., Lexington, KY.
D. I. Carey, A. B. Crane, and D. J. Henderson.
Water Resources Bulletin, Vol. 14, No. 1, p 109-118, February 1978. 3 fig, 1 tab, 7 ref, 1 append.

Descriptors: *Computer programs, *Programming languages, *Information exchange, Model studies, Computer models, Mathematical models, Runoff, Rainfall, Hydrology, FORTRAN.

The difficulty in understanding the listings of many available hydrologic models programmed in FORTRAN is a serious limitation to their verification and use. By expending more effort in creating written computer programs, more information can be transferred to those interested in modeling hydrologic processes. The use of simulation languages to produce more understandable program listings and increase the flow of information was recommended. An example was presented in which surface water runoff from storms on small rural watersheds is modeled. (Sims-ISWS)
W78-05025

SHALLOW WAVE PROPAGATION IN OPEN CHANNEL FLOW,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-05045

IMPINGEMENT OF AXISYMMETRIC DEVELOPING JETS,
Research Council of Alberta, Edmonton. Transportation and Surface Water Engineering Div.
For primary bibliographic entry see Field 8B.
W78-05047

2F. Groundwater

THE KINETICS OF MINERAL DISSOLUTION IN CARBONATE AQUIFERS AS A TOOL FOR HYDROLOGICAL INVESTIGATIONS, II. HYDROGEOCHEMICAL MODELS,
Tahal-Water Planning for Israel Ltd., Tel Aviv.
A. Mercado.
Journal of Hydrology, Vol 35, No 3/4, p 365-384, November 1977. 10 fig, 13 ref. OWRT B-038-NMEX(3).

Descriptors: *Dissolved solids, *Mineral water, *Transmissivity, *New Mexico, Model studies, Mathematical models, Aquifers, Chemicals, Water chemistry, Groundwater, Groundwater movement, Spatial distribution, Hydraulic conductivity, Permeability, Recharge, Rainfall, Water quality, Limestones, Hydrology, *Hydrogeochemistry, *Roswell(NM).

A general differential equation, describing the dissolution of minerals and the transport of their products in porous media, was derived and simplified for the case of steady-state, non-equilibrium distribution of solutes in confined carbonate aquifers. The numerical solution of the equation, which represents the hydrogeochemical model of a given aquifer, was based on the transformatiion of aquifer space coordinates into time coordinates of 'tracing points' moving along groundwater streamlines, followed by an inverse transformation which yields theoretical water quality maps. The applicability of the model for integrating hydrologic and geochemical data in aquifers was demonstrated for the limestone aquifer of Roswell, New Mexico. (See also W75-08190) (Sims-ISWS)
W78-04716

EVALUATION OF GROUNDWATER RESERVES IN THE SANTA CRUZ VALLEY AREA, PIMA AND SANTA CRUZ COUNTIES, ARIZONA,
Arizona Univ., Tucson. Dept. of Geosciences.
For primary bibliographic entry see Field 4B.
W78-04819

A MODIFIED OPTIMIZATION METHOD OF ESTIMATING AQUIFER PARAMETERS,
United Nations Centre for Natural Resources, Energy, and Transport, New York. Dept. of Economic and Social Affairs.
A. Navarro.
Water Resources Research, Vol. 13, No. 6, p 935-939, December 1977. 3 tab, 15 ref.

Descriptors: *Optimization, *Mathematical models, *Aquifer characteristics, *Hydraulic properties, Estimating, Transmissivity, Storage coefficient, Equations, Computer models, *Inverse problem.

A modified optimization methof for estimating transmissivity and storativity parameters was utilized for he fast calibration of mathematical models of transient aquifers. The method provides 'usable solutions' at an intermediary point between the minimization of residuals in the water budget equations and the similitude of solutions to field estimations of parameters T and S. Four field examples of the use of the method were given and discussed in terms of relative accuracy of results. (Visocky-ISWS)
W78-04826

GROUND-WATER RESOURCES OF POSEY COUNTY, INDIANA,
Geological Survey, Mineola, NY. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04862

GROUND-WATER RESOURCES OF CHESTER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04869

HYDROLOGIC EVALUATION OF THE ARIKAREE FORMATION NEAR LUSK, NIOBRARA AND GOSHEN COUNTIES, WYOMING,
Geological Survey, Cheyenne, WY. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04873

SURFACE CHEMICAL PROCESSES IN GROUND-WATER SYSTEMS,
Geological Survey, Menlo Park, CA. Water Resources Div.
J. D. Hem.
In: Proceedings of the Second International Symposium on Water-Rock Interaction, Strasbourg, France, August 17-25, 1977, p IV 76 - IV 85, 1977. 3 fig, 16 ref.

Descriptors: *Water chemistry, *Groundwater, *Chemical reactions, *Interfaces, *Sorption, Chemical precipitation, Ion exchange, Catalysts, Oxidation, Reduction(Chemical), Soils, Subsoil, Earth-water interfaces, Seepage, Groundwater movement.

Surface areas exposed per unit of volume of ground water stored in an aquifer can range from less than a square meter per liter up to 2000 sq m/liter or more. A liter of water may contact as much as 10,000 sq m/m of distance traveled. Dissolution and precipitation processes will be promoted by high surface to volume ratios but attainment of solubility equilibrium may still be slow enough to permit existence of broad transition unsaturated zones near recharge sources. Fast processes such as ion exchange sorption, however, tend to be completed in very narrow transition zones. Redox processes at iron and manganese surfaces may control concentrations of other metals. Quantitative models are given for reduction of copper at ferric oxyhydroxide surfaces and oxidation and coprecipitation of cobalt with manganese oxide. Disproportionation of mixed valence manganese oxide can be a highly effective oxidation mechanism. (Woodard-USGS)
W78-04877

WATER-LEVEL DECLINES, LAND SUBSIDENCE AND EARTH FISSURES IN SOUTH-CENTRAL ARIZONA,
Geological Survey, Phoenix, AR. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04878

GROUNDWATER FLOW IN WEATHERED GRANITE IN THE TAMNE BASIN, NORTH EAST GHANA,
Council for Scientific and Industrial Research, Accra (Ghana).
For primary bibliographic entry see Field 4B.
W78-04923

GEOPHYSICAL INVESTIGATIONS OF GROUNDWATER RESOURCES IN THE KALAHARI BASIN,
Council for Scientific and Industrial Research, Pretoria (South Africa), National Physical Research Lab.
For primary bibliographic entry see Field 4B.
W78-04931

GEOTHERMAL ENERGY IN THE PACIFIC REGION,
Colorado School of Mines, Golden.
For primary bibliographic entry see Field 4B.
W78-04942

DETERMINATION OF TRANSPORT MODEL PARAMETERS IN GROUNDWATER AQUIFERS,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Soil and Water Engineering.
For primary bibliographic entry see Field 5B.
W78-05043

GROUNDWATER AND NEARSHORE HYPOSALINE CONDITIONS AT FANNING ISLAND DURING A PERIOD OF HIGHER THAN NORMAL RAINFALL,
Hawaii Univ., Honolulu. Dept. of Zoology.
E. B. Guinther.
Pac Sci. 28(3), p 319-338, 1974.

Descriptors: *Groundwater, *Hyposaline conditions, Pacific Ocean islands, Estuaries, *Aquifers, *Fanning Island, Nearshore processes, Coral reefs, *Rainfall, Saline water.

Exceptionally high rainfall levels accompanying instability of the Intertropical Convergence Zone in 1972 greatly expanded the freshwater realm of Fanning Island (Line Island, Central Pacific Ocean). Changes in the head of the groundwater body (a Ghyben-Herzberg aquifer), as measured at frequent intervals in 11 wells, revealed variations in sediment permeabilities but proved an unsuccessful technique for determining amounts of freshwater discharge into inlets along the shore. The aquifer stores freshwater and maintains reduced salinities in the inlets along after an initial salinity depression during the period of precipitation. The spatial and temporal distribution of salinities in the inlets of the atoll closely resembled those of an estuary. However, the factors contributing to salinity fluctuations in each inlet are sufficiently complex and show both regular and irregular patterns of temporal variation, so that the inlets constitute highly unpredictable environments. The biological implications of this unpredictability are deemed interesting because of the close proximity to the predictable and stable environments of the tropical, shallow water lagoon (coral) reefs.--Copyright 1975, Biological Abstracts, Inc.
W78-05110

REGIONAL GEOLOGY SERIES: PART 2, HIGH PLAINS GROUND WATER REGION,
National Water Well Association, Worthington, OH.
J. A. Hunt.
Water Well Journal, Vol 32, No 3, p 83-84, March, 1978. 1 fig.

Descriptors: *Groundwater, *Aquifers, *High plains, *Ogallala aquifer, Texas, Kansas, Oklahoma, Nebraska, Rotary drilling, Water wells, Water supply, Alluvium, Overdraft.

The High Plains ground water region is a narrow discontinuous belt that stretches from southern South Dakota to southwestern Texas. The ground water supply occurs primarily in the Ogallala formation, the huge alluvial apron formed at the foot of the Rocky Mountains which was subsequently uplifted. This deposit covers an eroded surface to a thickness that exceeds 500 feet in some places. Ground water storage is estimated at two billion acre-feet. Except for some areas in Nebraska, recharge rates are generally thought to be less than 1% of rainfall. Because ground water pumpage throughout the High Plains exceeds 8,000,000 gallons per day (9,000,000 acre-feet annually), increased utilization of water management techniques will be necessary to avoid severe shortages in the area. Typical wells in the High Plains are of gravel pack construction, drilled by straight or reverse rotary methods using either clear water or small amounts of mud. The sands encountered during drilling are easily penetrated, while clays in the formation help maintain hole stability. Boulders and 'slip clay' occasionally pose drilling problems. (Eberle-NWWA)
W78-05199

2G. Water In Soils

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE WATER: PART I. SOIL-WATER QUALITY AND VEGETATIVE RESPONSES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-04704

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE WATER: PART II, SOIL PHYSICAL AND CHEMICAL CHANGES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-04705

COMPUTATION OF INFILTRATION FOR UNSTEADY UNINTERRUPTED HIGH RAINFALL,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 2B.
W78-04715

SOIL HYDRAULIC PROPERTIES DETERMINED BY INFILTRATION EXPERIMENTS AND SIMULATION,
Wyoming Univ., Laramie. Water Resources Research Inst.
W. J. Anderson, and W. G. Hedstrom.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 315, Price codes: A05 in paper copy, A01 in microfiche. Wyoming Water Resources Series No. 70, November, 1977. 73 p, 24 fig, 32 ref, 3 append. OWRT A-007-WYO(1), 14-31-0001-3551, 3851.

Descriptors: *Infiltration, *Infiltration rate, *Simulation analysis, Irrigation efficiency, *Soil physical properties, Methodology, *Computer programs, *Richards equation.

The objective was to develop and test a method for determining the water content - matric potential relationship and the hydraulic conductivity - matric potential relationship for infiltration into soil. A computer program developed to solve the Richards equation used these relationships to simulate infiltration into soil under various conditions. Evaluation of the proposed method consisted of conducting several infiltration experiments using soil columns from which infiltration rate-time data, the initial and final water contents, and an estimate of the hydraulic conductivity at the final water content were obtained. Simulation of the infiltration tests was performed by the computer using various parameters including the bubbling matric potential , pore size distribution index, transition values on the theta (h) curve, and the hydraulic conductivity at the final water content in the previously mentioned relationship. The parameters were varied until the simulated and observed infiltration rate-time relationships agreed closely. Experimental tests were also run to determine the agreement of these parameters to those resulting from the simulation. Results showed that the proposed method can be used to determine the above relationships by numerical simulation of infiltration.
W78-04812

EFFECT OF SPRAY IRRIGATION OF MUNICIPAL WASTEWATER ON SOIL INVERTEBRATE POPULATIONS AND THE POTENTIAL INFLUENCE ON PHYSICAL FACTORS OF SOIL,
State Univ. of New York Coll. of Environmental Science and Forestry. Dept. of Environmental and Forestry Biology.
For primary bibliographic entry see Field 5C.
W78-04818

RADIOECOLOGY,
For primary bibliographic entry see Field 5C.
W78-04820

DETERMINATION OF WATER IN SURFACE SOILS BY ACOUSTIC METHODS,
South Dakota State Univ., Brookings. Dept. of Electrical Engineering.
R. A. Higgins.
Available from the National Technical Information Service, Springfield, VA 22161, As price codes: A03 in paper copy, A01 in microfiche. South Dakota Water Resources Institute, Brookings, Partial Completion Report, August 1975. 45 p, 18 fig, 2 tab, 31 ref. OWRT B-027 SDAK(1).

Descriptors: Soil Water, *Acoustic methods, *Soil moisture meters, *Measurement, *Loan, Instrumentation, Correlation analysis.

The objective was to develop an acoustic method for soil moisture determination. Three phases of this research were: (1) Development of system to send and receive elastic waves through soils. (2) Development of an experiment to obtain accurate indications of acoustic transmission parameters. (3) Development of analysis and interpretive methods to obtain soil mositure information from acoustic measurements. The third phase, if successful, leads to a formulation of principles for the design of an acoustic soil moisture monitoring device. For a silt loam soil, a series of acoustic measurements from 0 to 14 KHz was taken for eleven moisture conditions from 0 to 0.912 of saturation. Simultaneously, gamma-ray density scanning of the sample provided independent measurement of the soil moisture profile. In the frequency range from 3600 to 6975 Hz these correlations indicated that acoustic transmission was an increasing function of soil moisture. Multiple regression analysis give two possible relationships. In the frequency range from 900 to 1595 Hz, the analysis yielded negative correlation indicating a tendency for acoustic loss to increase with soil moisture. Additional results in the frequency range 450 to 675 Hz gave positive correlations to soil moisture with different minimum regression lines. Further measurement and analyses would provide more extensive information applicable in formulating design principles for an acoustic soil moisture monitor and the development of a soil moisture instrument suited to a variety of soil types.
W78-04821

EXPERIMENTAL EVALUATION OF THEORETICAL SOLUTIONS FOR SUBSURFACE DRAINAGE AND IRRIGATION,
North Carolina State Univ. at Raleigh. Dept. of Biological and Agricultural Engineering.
Y. K. Tang, and R. W. Skaggs.
Water Resources Research, Vol. 13, No. 6, p 957-965, December 1977. 12 fig, 3 tab, 23 ref.

Descriptors: *Drainage, *Subsurface irrigation, *Laboratory tests, *Model studies, Mathematical models, Soil properties, Soils, Water table, Hydraulic conductivity, Porosity, Equations, Irrigation, Soil water, Soil water movement, Unsaturated flow, Saturated flow, Agriculture watersheds.

The Richards equation for two-dimensional saturated-unsaturated water movement was solved for drainage and subirrigation boundary conditions by using finite difference methods. The solutions were compared to results of experiments conducted for various initial and boundary conditions in a arge laboratory soil tank. The soil water characteristic and hydraulic conductivity function were measured by conventional methods and used as inputs in the numerical solution to the Richards equation. Although predicted water table drawdown was somewhat slower than was observed, agreement between the numerical solutions and experimental observations was good. Approximate methods also were used to characterize drainage and subirrigation and were found to be in good agreement with solutions to the more exact Richards equation and with experimental results when a variable drainable porosity is considered. In view of significant field varibility of soil properties and the difficulty of measuring those properties required by the Richards equation, it appears that simpler, approximate methods will continue to be more useful than the exact approach for predicting water table movement under drainage and subirrigation conditions. (Simms-ISWS)
W78-04828

INFLUENCE OF THE HYSTERESIS EFFECT ON TRANSIENT FLOWS IN SATURATED-UNSATURATED POROUS MEDIA,
Toulouse-3 Univ. (France). Inst. de Mecanique des Fluides.
N. T. Hoa, R. Gaudu, and C. Thirriot.
Water Resources Research, Vol. 13, No. 6, p 992-996, December 1977. 5 fig, 7 ref.

Descriptors: *Hysteresis, *Porous media, *Unsteady flow, *Model studies, Mathematical models, Laboratory tests, Soils, Soil properties, Physical properties, Hydraulic conductivity, Saturated flow, Unsaturated flow, Soil water movement, Analytical techniques, Soil physics, Soil science.

One-and two-dimensional transient flows where the hysteresis of the relationship of suction-water content clearly appears were studied experimentally and numerically. In the numerical simulation of these flows, by using a finite element method, the hysteresis effect was taken into account by considering both its primary and secondary scanning curves; when the seepage surface occurred, it too was taken into account. The comparison with experimental results showed that in the concerned problems a numerical simulation in which this hysteresis effect is ignored may involve important errors. (Sims-ISWS)
W78-04833

PARAMETER ESTIMATION OF THE GREEN AND AMPT INFILTRATION EQUATION,
Agricultural Research Service, Boise, ID. Northwest Watershed Research Center.
D. L. Brakensiek, and C. A. Onstad.
Water Resources Research, Vol 13, No 6, p 1009-1012, December 1977. 2 fig, 2 tab, 10 ref.

Descriptors: *Infiltration, *Runoff, *Model studies, Mathematical models, Equations, Hydraulic conductivity, Porosity, Capillary conductivity, Soil water, Soil water movement, Hydrographs, Overland flow, Watersheds(Basins).

Infiltrometer data were utilized to test a fitting procedure for the Green and Ampt infiltration equation parameters. The spatial variation of the estimated parameters was averaged to give lumped parameter values for watershed modeling. An appropriate scale for parameter averaging was discussed, which transforms parameter values to normal deviates. A sensitivity analysis for the equation parameters was performed for both infiltration estimates and runoff hydrograph volume and peak rates. The capillary pressure parameter shows least sensitivity; however, variation in the fillable porosity and effective conductivity parameters has a major influence on infiltration and runoff amounts and rates. (Sims-ISWS)
W78-04836

RAINFALL PARAMETERS FOR SOIL LOSS ESTIMATION IN A SUBTROPICAL CLIMATE,
Rhodesia Dept. of Conservation and Extension, Salisbury.
H. A. Elwell, and M. A. Stocking.
J Agric Eng Res. 18(3), p 169-177, 1973.

Descriptors: *Africa, *Climates, *Rainfall, *Soil loss, Subtropical climates, *Soil erosion.

Underlying relationships between subtropical rainfall variables and soil losses from agricultural lands in central Africa are studied. Long-term average annual soil losses can be predicted from specific field conditions, provided only that a sufficiently long period of autographic rainaguage recordings are available. The extent to which the physical conditions on the earth's surface influence the type of parameters most closely related to soil losses is discussed. Parameters are categorized according to their practical and theoretical applications. The practical significance of the results is discussed.–Copyright 1974, Biological Abstracts, Inc.
W78-04894

ARID ZONE IRRIGATION, ECOLOGICAL STUDIES: ANALYSIS AND SYNTHESIS, VOL. 5,
For primary bibliographic entry see Field 3F.
W78-04926

WATER QUALITY AND SOIL PROPERTIES: WATER QUALITY AND ITS EFFECT ON THE PROPERTIES OF LIGHT TEXTURED SOILS,
Rajasthan Coll. of Agriculture, Jaipur (India). Dept. of Soil Science and Agricultural Chemistry.
P. Lal, and F. Lal.
Annals of Arid Zone, Vol 16, No 2, p 213-220, June 1977. 3 tab, 15 ref.

Descriptors: *Water analysis, *Irrigation water, *Irrigation effects, Chemical analysis, Irrigation, *Soil analysis, Boron, Salts, Salinity, Soil chemical properties, Sodium, Soil profiles, Soil management, Soil improvement, Soil texture, Permeability, Hydrologic properties, Soil tests, Saturation, Water quality, India(Rajasthan).

Forty-seven water samples and an equal number of corresponding soil samples from the semi-arid region of Rajasthan were analyzed for different constituents. Results showed the majority of water samples belonged to high salinity and sodium categories. The potential salinity and residual sodium carbonate were also high and significant positive correlation coefficients were found between both EC and potential salinity of irrigation water and EC of saturation extract of the irrigated soils. Similarly, significant positive correlations were obtained between SAR and residual sodium carbonate of the water and ESP of the irrigated soils as well as between boron contents of the water and water soluble boron in the soils. The hydraulic conductivity of irrigated soils was negatively correlated with the permeability index of water. In general, the EC of saturation extract and water soluble boron in irrigted soils were 63.6% and 60% of the EC and boron content of water respectively. The need for suitable standards for judging water suitability for light textured soils is emphasized. (Payton-Arizona)
W78-04930

SOIL MOISTURE SENSING WITH AIRCRAFT OBSERVATIONS OF THE DIURNAL RANGE OF SURFACE TEMPERATURE,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
T. Schmugge, B. Blanchard, A. Anderson, and J. Wang.
Water Resources Bulletin, Vol. 14, No. 1, p 169-178, February 1978. 7 fig, 1 tab, 7 ref.

Descriptors: *Remote sensing, *Soil moisture, *Soil temperature, *Arizona, Aircraft, Soil surfaces, Temperature, Diurnal, Data processing, Correlation analysis, Vegetation, Crops, Irrigation, Agriculture, Soil moisture sensing, Crop status, *Phoenix(Ariz).

Aircraft observations of the surface temperature were made by measurements of the thermal emission in the 8-14 micrometer band over agricultural fields around Phoenix, Arizona. The diurnal range of these surface temperature measurements was well correlated with the ground measurement of soil moisture in the 0-2 cm layer. The surface temperature observations for vegetated fields were found to be within 1 or 2C of the ambient air temperature, indicating no moisture stress. These results indicated that for clear atmospheric conditions remotely sensed, surface temperatures can be a reliable indicator of soil moisture conditions and crop status. (Sims-ISWS)
W78-05027

FINE PARTICULATE EMISSIONS DUE TO WIND EROSION,
National Center for Atmospheric Research, Boulder, CO.
For primary bibliographic entry see Field 2J.
W78-05032

TRANSIENT DRAINAGE EQUATIONS FOR NON-HOMOGENEOUS SOILS,
South Dakota State Univ., Brookings. Dept. of Agricultural Engineering.
S. T. Chu.
Transactions of the American Society of Agricultural Engineers, Vol 20, No 6, p 1085-1088, November-December 1977. 3 fig, 3 tab, 9 ref.

Descriptors: *Drainage, *Soils, *Unsteady flow, *South Dakota, Water table, Theoretical analysis, Model studies, Mathematical models, Analytical techniques, On-site tests, Water levels, Hydraulic conductivity, Equations, Soil physical properties, Non-homogeneous soils, Drain spacing.

One of the limitations inherent in the derivation of many transient dranage equations is the assumption of a homogeneous soil. Graphical representation of transient drainage equation for non-homogeneous soil was obtained by a scheme devised by Bouwer. He devised a scheme where the soil profile is split up into a number layers. Within each layer, the soil parameters were considered as constants. He combined the solutions for each layer and obtained the solution of the Green and Ampt infiltration equation for non-homogeneous soils. The application of the theoretical solution to predict the fall of a water table was illustrated. An evaluation of the theory by field measurements was presented. Good agreement between the the theoretical and field measured water table height was found. (See also W70-02447) (Humphreys-ISWS)
W78-05033

LIME TREATMENT OF DAMS CONSTRUCTED WITH DISPERSIVE CLAY SOILS,
Soil Conservation Service, Grenada, MS.
For primary bibliographic entry see Field 8D.
W78-05035

PHYSICAL AND CHEMICAL PARAMETERS AFFECTING TRANSPORT OF 137CS IN ARID WATERSHEDS,
Agricultural Research Service, Oxford, MS. Sedimentation Lab.
For primary bibliographic entry see Field 5A.
W78-05042

SOIL SALINITY- FOUR-ELECTRODE CONDUCTIVITY RELATIONSHIPS FOR SOILS OF THE NORTHERN GREAT PLAINS,
Agricultural Research Service, Sidney, MT.
A. D. Halvorson, J. D. Rhoades, and C. A. Reule.
Soil Science Society of America Journal, Vol. 41, No. 5, p 966-971, September-October 1977. 4 fig, 5 tab, 12 ref.

Descriptors: *Saline soils, *Soil texture, *Electrodes, *Electrical conductance, *Great Plains, *Montana, *North Dakota, Calibrations, Instrumentation, Conductivity, Measurement, Correlation analysis, Regression analysis, Soil water, Seepage, Sampling, *Saturation extract electrical conductivity, *Bulk soil electrical conductivity, Four-electrode technique, Parent material, Dryland salinity, Soil sample.

Influence of soil texture, soil geographic location, and parent material and calibration method on the linear EC sub e-EC sub a relationship was investigated. Linear regression relationships between saturation extract electrical conductivity (EC sub e), and bulk soil electrical conductivity (EC sub a) as measured by the four-electrode technique were developed for northern Great Plains soils. Most correlation coefficients (r) exceeded 0.95, and all were significant at the 0.01 probability level. Geographic location had little effect on the EC sub e vs EC sub a relationship; therefore, an EC sub e vs EC sub a calibration made for a soil textural class at one location will apply to another location having a similar range in soil water, clay content, and salinity. Clay content affected linear regression line slopes more than did other factors investigated. Regression slopes varied from 3.06 for a clay to 12.99 for a loamy sand over the clay concentration range of 63.0 to 6.5%, respectively. To minimize adverse effects caused by natural variation in soil texture, water content, and salinity when making field EC sub e vs EC sub a calibrations, artificial salinization of columns of the soil type in question, which will permit subsequent analysis of the soil by either the cell or EC-probe calibration method, was suggested. (Visocky-ISWS)
W78-05046

RESUSPENSION OF PLUTONIUM FROM CONTAMINATED LAND SURFACES: METEOROLOGICAL FACTORS,
Environmental Monitoring and Support Lab., Las Vegas, NV. Office of Research and Development.
For primary bibliographic entry see Field 5B.
W78-05056

NOTE ON THE PARLANGE METHOD FOR THE NUMERICAL SOLUTION OF HORIZONTAL INFILTRATION OF WATER INTO SOIL,
National Council for Scientific Research, Lusaka (Zambia).
J. Cisler.
Soil Sci. 117(1), p 70-73, 1974.

Descriptors: *Diffusivity, *Infiltration(Horizontal), Numerical studies, *Parlange methods, Soils, Water.

Parlange's approximate analytical solution for the horizontal infiltration of water into soil is numerically tested for the case of 2-step diffusivity function and also for the Yolo Light Clay diffusivity of Philip (1957). Parlange's 2nd approximation for the Boltzman variable =x.t to the -1/2 power (where x is the horizontal coordinate; t is time) as a function of moisture content gives in both cases too high values, as compared to the analytical solution for 2-step diffusivity, or Philip's solution for the soil-water case. The error decreases as the diffusivity function approaches more closely to the delta-function type of diffusivity. The improved 2nd approximation of Parlange is, however, very precise, even for the diffusivities, which are not of delta-function type. The increase of labor of this improved approximation is very small. A recurrence formula for the successive O's is also examined, but it is found, however, that this formula does not give convergent values and the computational effort is larger than the improved 2nd approximation.--Copyright 1974, Biological Abstracts, Inc.
W78-05098

IMPACT OF WATER LEVEL CHANGES ON WOODY RIPARIAN AND WETLAND COMMUNITIES. VOLUME I: PLANT AND SOIL RESPONSES TO FLOODING,
Missouri Univ.-Columbia. School of Forestry, Fisheries and Wildlife.
For primary bibliographic entry see Field 6G.
W78-05101

PERSISTENCE OF AZINPHOSMETHYL IN SOIL,
Environmental Protection Agency, Wenatchee, WA. Field Studies Section.
For primary bibliographic entry see Field 5B.
W78-05121

PROBLEMS INVOLVED IN MEASURING THE SOIL THERMAL CONDUCTIVITY AND DIFFUSIVITY IN A MOIST SOIL,
Agricultural Research Organization, Bet-Dagan (Israel). Div. of Soil Physics.
A. Hadas.
Agric Meteorol. 13(1), p 105-113, 1974.

Descriptors: *Diffusivity, Planar probes, *Soil thermal conductivity, Measurement, *Soil moisture, Moisture content.

The methods of cylindrical or planar probes for determining the thermal conductivity and diffusivity of soils involve problems of probe-soil contact impedance of unknown magnitudes which impairs accuracy. Probe-soil contact impedance was determined experimentally for planar probe in a moist soil and used to evaluate the expected accuracy of determining the soil thermal properties in situ. Planar or cylindrical probes should be used in moist soils, provided low thermal outputs of short duration are applied.--Copyright 1975, Biological Abstracts, Inc.
W78-05122

FIELD MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF LAKELAND FINE SAND,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
L. Wang, and A. R. Overman.
Soil Crop Sci Soc Fla Proc. 33, p 154-157, 1974.

Descriptors: Fine sands, *Florida, Flow, *Hydraulic conductivity, Lakeland, Measurement, Neutron scattering, *Sands, Soil, Tensiometer, Water level recording, *Infiltration, Drainage, *Soil profiles.

Infiltration and drainage experiments were conducted in a basin located at Southwest Sewage Treatment Plant, Tallahassee, Florida from Sept.-Dec. 1972. Field hydraulic data were collected with neutron scattering, tensiometer and water level recorder procedures. A soil water-pressure characteristic curve previously derived from a Tempe cell was used to convert pressure head values to water content. A computer program based on the instantaneous profile method was used to determine field hydraulic conductivity by analyzing various hydraulic data. The instantaneous profile method gives reasonable results when the profiles are known. It works well for field data, The results show the variation of hydraulic conductivity within the soil profile.--Copyright 1975, Biologica Abstracts, Inc.
W78-05127

TRANSFORMATION OF S35-LABELLED SULPHATE IN AEROBIC AND FLOODED SOIL CONDITIONS,
Indian Agricultural Research Inst., New Delhi. Nuclear Research Lab.
M. S. Sachdev, and P. Chhabra.
Plant Soil. 41(2), p 335-341, 1974.

Descriptors: Flooding, *Aerobic conditions, Amino acids, *Flooded soils, Humus, Hydrogen, Organic matter, Soil, *Sulfates, Sulfide, Sulfur, *Sulfur-35.

After 4 mo. of incubation 68.1% of the added sulfate was present in the aerobic condition, and only 12.7% in flooded conditions. The main transformation was into organic forms, 28.1 and 37.8% in aerobic and flooded soil conditions respectively. In aerobic condition 99% of the added sulfate S could be accounted for in different fractions determined viz sulfate, organic, humus, amino acid and evolved hydrogen sulfide-sulphur. In flooded condition only 56% was present in all these fractions, which indicates that remaining 44% is in chemical forms between SO4 to the -2 power and S to the -2 power.--Copyright 1975, Biological Abstracts, Inc.
W78-05152

DISTRIBUTION OF PURPLE PHOTOSYNTHETIC BACTERIA IN WETLAND AND WOODLAND HABITATS OF CENTRAL AND NORTHERN MINNESOTA,
Minnesota Univ., St. Paul. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W78-05168

2H. Lakes

EFFECTS OF DESTRATIFICATION ON DEPTH DISTRIBUTION OF FISH,
Oklahoma Cooperative Fishery Research Unit., Stillwater.
For primary bibliographic entry see Field 5C.
W78-04713

DISTRIBUTION AND ABUNDANCE OF BENTHIC ALGAE ALONG PHOSPHATE GRADIENTS IN KOOTENAY LAKES, BRITISH COLUMBIA,
For primary bibliographic entry see Field 5B.
W78-04737

PHYTOPLANKTON IN LAKE HJALMAREN,
Uppsala Univ. (Sweden). Inst. of Ecological Botany.
For primary bibliographic entry see Field 5C.
W78-04739

ORTHOPHOSPHATE CONCENTRATION AND FLUX WITHIN THE EPILIMNIA OF TWO CANADIAN SHIELD LAKES,
For primary bibliographic entry see Field 5C.
W78-04740

THE SALINE LAKES OF SASKATCHEWAN,
U. T. Hammer, R. C. Haynes, J. M. Heseltine, and S. M. Swanson.

Verh. Internat. Verein. Limnol, Vol 19, p 589-598, October 1975. 3 fig, 2 tab, 36 ref. NRC A1412.

Descriptors: *Saskatchewan(Canada), *Saline Lakes, *Aquatic life, *Ecosystems, *Canada, Salinity, Lakes, Phytoplankton, Primary productivity, Zooplankton, Benthic fauna, Fish, Aquatic plants.

Literature on some 40 saline lakes in Saskatchewan, Canada was examined, and comparative data on physical and chemical characteristics, phytoplankton primary production, vascular hydrophytes, zooplankton, benthic fauna, and fish are presented. Lakes above 3% salinity are concentrated in the prairies, but also occur in the aspen-grove region and rarely in the forest zone. Salinity varies from 3-370 g/l, size from a few hectares to 420 sq km, depth from 1-20 m, Secchi disk transparency from 10-cm-10 m, and pH from 8.0-9.8 (alkaline) during the open water season. The lakes are predominantly magnesium-sodium sulfate lakes. Phytoplankton productivity measured in seven lakes varied from 0.053 g C/sq m/day to 7.968 g C/sq m/day. Only Humboldt and Manito lakes had high productivity; for the others, mean productivity was less than 0.250 g C/sq m/day. Studies have shown that species diversity of vascular hydrophytes in saline lakes is inversely related to salinity. The zooplankter Artemia salina occurs in the most saline waters, while cladocerans are abundant in all lakes up to 53% salinity. Copepods are extremely numerous in some lakes. Rotifers occur in waters of all salinities. Benthic fauna are not found in lakes over 55-121 g/l salinities, but Coleoptera and Diptera occur over the widest salinity range, with the greatest number of species. Bivalvia, Hirudinea, Ephemeroptera, and Trichoptera are generally confined to waters of low salinity; fish do not do well in saline waters. (Lynch-Wisconsin)
W78-04741

SEASONAL VARIATION OF THE CLADOCERA POPULATION AT A COASTAL STATION AT LAKE MANTOVA, (IN ITALIAN),
Bologna Univ. (Italy). Ist. diZoologia.
M. G. Corni, and E. Stranieri.
Boll Pesca Piscic Idrobiol 30(1), p 103-110, 1975.

Descriptors: *Crustaceans, Lakes, A croperus-harpae, Alona-affinis, Alona-guttata, Alona-rectangula, Alonella-rostrata, Camptocercus-rectirostris, Ceratophyllum-demersum, Chydorus-sphaericus-var-coelatus, Chydorus-sphaericus-var-leonardi, Eurycercus-lamellatus, Graptoleberis-testudinaria, Leydigia-leydigi, Peracantha-truncata, Pleuroxus-duncus, *Seasonal, Side-crystallina, Simocephalus-vetulus, Vallisneria-spiralis, Vegetation, *Lake Mantova(Italy).

Populations of coastal cladocera were collected among vegetation in a fixed station on the upper section of Mantova Lake (Italy) named Punta Angeli. Fifteen species (Acroperus Harpae, Alona guttata, A. rectangula, A. affinis, Leydigia leydigi, Graptoleberis testudinaria, Peracnta truncata, Pleuroxus aduncus, Chydorus sphaericus var. coelatus, C. sphaericus var. leonardi, Eurycercus lamellatus, Alonella rostrata, Camptocercus rectirostris, Sida crystallina, Simocephalus vetulus/were classified, among which C. spaericus, P. aduncus and A harpae are particularly abundant. In Nov. 1972 females of P. females of P. aduncus with resting eggs were observed. Almost all the species decrease in Aug. in relation to the decay of Ceratophyllum demersum and Vallisneria spiralis.--Copyright 1977, Biological Abstracts, Inc.
W78-04742

PRIMARY PRODUCTIVITY AND PHYTOPLANKTON OF LAKES ON THE EASTERN CANADIAN SHIELD,
For primary bibliographic entry see Field 5C.
W78-04743

PHYTOPLANKTON IN SEVEN MONOMICTIC LAKES NEAR ROTORUA, NEW ZEALAND,
For primary bibliographic entry see Field 5C.
W78-04749

STUDIES ON THE LORICA STRUCTURE IN CHRYSOPHYCEAE,
Copenhagen Univ. (Denmark). Inst. of Plant Anatomy and Cytology.
For primary bibliographic entry see Field 5C.
W78-04750

THE FINE STRUCTURE OF SOME PELAGIC FRESH WATER DIATOM SPECIES UNDER THE SCANNING ELECTRON MICROSCOPE. I,
Uppsala Univ. (Sweden). Dept. of Quaternary Geology.
M.-B. Florin.
Svensk Botanisk Tidskrift, Vol. 64, No. 1, p 51-64, 1970. 40 fig, 1 tab, 28 ref.

Descriptors: *Diatoms, *Plant morphology, *Melosira granulata, *Lakes, *Cell walls, Australia, New Zealand, Sweden, Lake Okareka(New Zealand), Lake Taupo(New Zealand), Lake Erken(Sweden), Prospect Dam(N.S.W. Australia), Chrysophyta, Electron microscopy, Bacillariophyceae, Silica, Lakes, Pelagic.

The structure of the silicious part of cell walls of the pelagic freshwater diatom genus Melosira was examined, using specimens from four lakes, with diatom asemblages dominated by species of the diatom. The lakes were: Lakes Okareka (March 1968) and Taupo (June 1956) on the North Island, New Zealand; Prospect Dam, New South Wales, Australia (1964), and Lake Erken, Uppland Province, Sweden (October 1961). Through electron microscopy, two types of Melosira granulata were distinguished in Lake Okareka. Type 1 is similar to the typical Melosira granulata specimens dominant in Prospect Dam, but has a larger number of finer spines on the terminal cell halves. Type 2 has broader cells, and resembles M. granulata v. muzzanensis, but the latter is described as having a larger number of pores in the pore rows. Type 2 also is similar to M. agassizii. The dominant species in Lake Okareka is M. granulata, Type 1. Melospira sp., which dominates the diatom assemblages of Lake Taupo, is similar to the description of M. pyxis, but also somewhat resembles M. baikalensis. In Lake Erken, M. granulata is the dominant species; ten other taxa have also been found. Spines at the edge of the disc of M. granulata in Lake Erken are finer and more numerous than individuals at Prospect Dam. (Lynch-Wisconsin)
W78-04751

ROTORUA PHYTOPLANKTON RECONSIDERED (NORTH ISLAND OF NEW ZEALAND),
Vaxtbiologiska Institutionen, Uppsala (Sweden).
For primary bibliographic entry see Field 5C.
W78-04753

FACTORS AFFECTING TRACE ELEMENT DISPERSION IN LAKE SEDIMENTS IN THE YELLOWKNIFE AREA, N. W. T., CANADA,
For primary bibliographic entry see Field 5B.
W78-04758

FACTORS AFFECTING THE STRUCTURE OF LIMNETIC CRUSTACEAN ZOOPLANKTON COMMUNITIES IN CENTRAL ONTARIO LAKES,
For primary bibliographic entry see Field 5C.
W78-04759

PRELIMINARY STUDIES ON THE KINETICS OF UTILIZATION OF ACETATE BY BACTERIOPLANKTON IN MIKOLAJSKIE LAKE,
Warsaw Univ. (Poland). Dept. of Environmental Microbiology.
For primary bibliographic entry see Field 5C.
W78-04760

A HYPOTHESIS TO EXPLAIN THE SUCCESSION FROM CALANOIDS TO CLADOCERANS DURING EUTROPHICATION,
For primary bibliographic entry see Field 5C.
W78-04761

THE DISTRIBUTION OF IRON IN A CLOSED ECOSYSTEM,
For primary bibliographic entry see Field 5B.
W78-04762

NUTRIENT KINETICS AND THE NEW TYPOLOGY,
For primary bibliographic entry see Field 5C.
W78-04763

LAKE EUTROPHICATION AND THE LIMITING CO2 CONCEPT: A SIMULATION STUDY,
For primary bibliographic entry see Field 5C.
W78-04766

CHEMICO-TROPHIC ATTRIBUTES OF DETRITAL AGGREGATES IN A NEW MEXICO ALKALINE RESERVOIR,
For primary bibliographic entry see Field 5C.
W78-04767

PHOSPHORUS SUPPLY IN UNDISTURBED LAKES IN KEJIMKUJIK NATIONAL PARK, NOVA SCOTIA (CANADA),
For primary bibliographic entry see Field 5C.
W78-04768

FLUX OF NUTRIENTS BY DIFFUSION THROUGH THE LAKE SEDIMENT-HYPOLIMNION INTERFACE FOR 9 LAKES IN MAINE, U.S.A.,
For primary bibliographic entry see Field 5C.
W78-04770

PRIMARY PRODUCTION IN FOUR SMALL LAKES IN THE CANADIAN ROCKY MOUNTAINS,
For primary bibliographic entry see Field 5C.
W78-04771

HYDROBIOLOGICAL STATE OF THE NADARBAZEVI RESERVOIR DURING THE FIRST YEARS OF ITS FILLING WITH FRESHWATER, (IN GEORGIAN),
L. E. Kutubidze, V. G. Tkeshelashvili, Z. Kereselidze, N. N. Chikvaidze, and D. D. Kadzhaya.
Soobshch Akad Nauk Gruz SSR 85(1), p 109-112, 1977.

Descriptors: *Hydrobiology, Reservoirs, Alkalinity, Carbon dioxide, Carp, Chironomids, Fish foods, Homoiothermy, Mineralization, Oxygen, Phytoplankton, Transparency, Zoobenthos, *Nadarbazevi reservoir(USSR), Primary productivity.

The Nadarbazevi reservoir (USSR) is characterized by low transparency, homoiothermy, weak alkalinity and normal content of O2. During the summer an increase of CO2 is observed, as well as variable mineralization and low content of biogenic elements. Phytoplankton (184 spp.) was identified in the reservoir. Primary production is minimal. Zooplankton is largely represented by eu-

ryhaline forms, and zoobenthos by chironomids. Mirror carp is the main food fish.--Copyright 1978, Biological Abstracts, Inc.
W78-04773

COMPARATIVE INTERSTITIAL WATER AND SEDIMENT CHEMISTRY IN OLIGOTROPHIC AND MESOTROPHIC LAKES, MAINE, U.S.A.,
For primary bibliographic entry see Field 5C.
W78-04774

THE ABUNDANCE AND SIGNIFICANCE OF PHYTOFLAGELLATES AND NANNOPLANKTON IN THE ST. LAWRENCE GREAT LAKES, 1. PHYTOFLAGELLATES,
For primary bibliographic entry see Field 5C.
W78-04775

A MALLOMONAS POPULATION,
Vaxtbiologiska Institutionen, Uppsala (Sweden).
For primary bibliographic entry see Field 5C.
W78-04776

ACTINOTAENIUM COSMARIUM AND STAURODESMUS IN THE PLANKTON OF ROTORUA LAKES,
Vaxbiologiska Institutionen, Uppsala (Sweden).
For primary bibliographic entry see Field 5C.
W78-04777

THE EDGE OF THE ARROWHEAD,
Minnesota Marine Advisory Service, Duluth. Office of Sea Grant.
R. Lydecker.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 017, Price codes: A04 in paper copy, A01 in microfiche. April 1976. 60 p, 34 fig.

Descriptors: *Minnesota, *Coasts, *Lake Superior, Lakes, Great Lakes, Economics, Shores, Water pollution, Sewage disposal, Sewage treatment, Water level fluctuations, St. Louis River(MN), Oligotrophy.

The geographical setting, history, economy, problems, and future of the Minnesota Lake Superior coast are described. For most of its length, the coastline forms the south eastern border of the Canadian North Woods, a bnd of boreal forest spilling over into the United States. Seventeen major streams flowing southeastward drain the 2,700 sq mi North Shore into Lake Superior, and there are 600 lakes in the area. More than 80% of the 136,400 inhabitants live in Duluth, the largest of the five cities on the coast. Inadequate sewage disposal systems, especially in non-metropolitan areas, pose a serious threat to water quality. Advanced minicipal waste treatment plants are expected for Two Harbors, Beaver Bay, Silver Bay, and Grand Marais By 1977. Heavy metal and chemical contamination has been detected in Lake Superior, although potential pollutants are not easily absorbed into the lake's very soft water, which on the north sore has a clarity to 65-75 ft. The St. Louis River, a major source of pollution on the coast, receives industrial and municipal effluents; by 1977, however, the Western Lake Superior Sanitary District treatment facility will remove 95% of all pollutants in the river, and will use a unique solid waste incinerator to burn sludge resulting from sewage treatment. The most severe problem for the coast has been extremely high water levels, including flooding and erosion between 1972-75 from above-normal precipitation. (Lynch-Wisconsin)
W78-04784

THE CONTRIBUTION OF AGRICULTURE TO THE EUTROPHICATION OF SWISS WATERS, I. RESULTS OF DIRECT MEASUREMENTS IN THE DRAINAGE AREA OF VARIOUS CHANNELS,
For primary bibliographic entry see Field 5C.
W78-04786

LAKE GEOCHEMISTRY IN THE KAMINAK LAKE AREA, DISTRICT OF KEEWATIN, N.W.T.,
R. A. Klassen, I. Nichol, and W. W. Shilts.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol. 19, p 340-348, October 1975. 5 fig, 3 tab, 14 ref.

Descriptors: *Kaminak Lake(N.W.T., Canada), *Geochemistry, *Sediments, *Lakes, *Metals, Canada, Bedrock, Circulation, Sediment-water interfaces, Keewatin District(N.W.T. Canada), Permafrost, Trace elements, Canadian Shield, Dissolved oxygen, Conductivity, Dispersion.

Geochemical sampling of five large, temperate, dimictic lakes in the Kaminak Lake area, Keewatin District (N.W.T., Canada) showed characteristics that differed from lakes in western and southern parts of the Canadian Shield. These characteristics included: (1) greater depth and thoroughness of water circulation; (2) high summertime oxygenation of both water and sediments; (3) high conductivity (180-360 micro-mho/cm) reflecting high dissolved solids; (4) very low organic carbon levels in the sediment (<1-27%; generally <6%); and (5) iron and manganese precipitate bands at and below the sediment-water interface. Trace metal levels, controlled mainly by organic carbon content, did not obviously reflect mineralized sources in the -210 micrometer fraction. The research is part of a larger study of relationships among bedrock, overburden, sediment, and water composition to assess factors affecting metal dispersion in lake sediments. A basis was needed for evaluating the potential lake sediment geochemistry in reconnaissance exploration; massive copper-zinc and copper-nickel sulfide occurrences are thought to have economic potential. The area is underlain by continuous permafrost 15-200 cm beneath the surface. Mean monthly air temperatures range from +15 to -30C. Water pH was 6.9-7.6 at the surface and 5.9-7.4 at the bottom. Dissolved oxygen at the surface was at or near saturation (9-10 ppm); absolute levels increase with depth and decreasing temperatures. (Lynch-Wisconsin)
W78-04809

SUBSTANTIVE CORRECTIONS TO SIL COMMUNICATIONS (IVL MITTEILUNGEN) NUMBERS 6 AND 20,
Wisconsin Univ.-Milwaukee. Center for Great Lakes Studies.
C. H. Mortimer.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol. 19, p 60-72, October 1975. 5 fig, 1 tab, 17 ref.

Descriptors: *Lakes, *Hydrodynamics, *Rotation(Earth), *Air saturation, *Geostrophic effects, Oxygen, Model studies, Stratification, Coriolis force, Waves(Water), Currents(Water), Limnology.

Corrections are submitted to two earlier papers, IVL Mitteilungen Numbers 6 (1956) and 20 (1974). In No. 6, 'Oxygen content of air-saturated fresh waters,' a set of nomograms and a slide rule were devised to aid calculation of percentage saturation, corrected for atmospheric pressure at the lake surface, when in-situ temperature and oxygen content of a water sample are known. They were based on oxygen solubility determinations published by Truesdale, Downing, and Lowden (1955). Subsequent work proved that the TDL solubility estimates were too low (By 0.45% at 30 C, and 2.9% at zero C in pure water) due to errors in the Winkler titration technique used by TDL. In Mitt. 20, 'Lake hydrodynamics,' the influence of the earth's rotation on internal motions in stratified lakes as treated in terms of the simplest models--rectangular channels and basins of uniform depth with two homogeneous layers, the interface forming the model thermocline. Rotation effects were estimated by computing currents which would arise in the absence of rotation and then imposing a condition of geostrophic equilibrium under which gravity exactly counterbalanced the Coriolis force. However, the necessity of including a term to induce the transverse slope introduces a discrepancy. The author here presents a better model which, instead of concentrating on geostrophic effects on currents, focuses on geostrophic effects on waves. (Lynch-Wisconsin)
W78-04810

A MODELING APPROACH FOR PREDICTING NUTRIENT INFLUENCES ON LAKES AND THEIR WATERSHEDS,
Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.
For primary bibliographic entry see Field 5C.
W78-04814

MEASUREMENTS OF THE SUMMER CURRENTS IN SAGINAW BAY, MICHIGAN,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
L. J. Danek, and J. H. Saylor.
Journal of Great Lakes Research, Vol. 3, No. 1-2, p 65-71, October 1977. 9 fig, 1 tab, 5 ref.

Descriptors: *Currents(Water), *Lake Huron, *Bays, *Michigan, Measurement, Current meters, Model studies, Mathematical models, Circulation, Water circulation, Lakes, Winds, Estuaries, Freshwater, Limnology, Path of pollutants, *Saginaw Bay(Mich), Drogues.

A combination of Lagrangian measurements and fixed current meter moorings was used during the summer of 1974 to determine the circulation patterns of Saginaw Bay. Because the bay is shallow, the water responds rapidly to wind changes. Distinct circulation patterns were determined for a southwest wind and a northeast wind. Speeds measured in the inner bay were of the order of 7 cm/s, whereas in the outer bay the speeds averaged closer to 11 cm/s. A typical water exchange rate between the inner and outer bay for winds parallel to the axis of the bay is 3700 cu m/s, but winds perpendicular to the axis of the bay cause little water to be exchanged. A comparison with the results of a numerical model for the bay indicated that there is good agreement between the data and the simulation of the circulation in the inner bay. However, the agreement is poor in the outer bay, where specification of proper boundary conditions at the open mouth of the bay is important for meaningful model simulations. (Sims-ISWS)
W78-04851

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. GREAT LAKES, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04855

HYDROLOGY OF LAKE PANASOFFKEE, SUMTER COUNTY, FLORIDA,
Geological Survey, Orlando, FL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04859

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, I. SALINITY VARIATIONS AND ESTIMATION OF RESIDENCE TIME,
Wollongong Univ. (Australia). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04882

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, II. THERMAL BEHAVIOUR,
Wollongon Univ. (Australia). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04883

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, III. DISTRIBUTION OF HEAVY METALS IN SEDIMENTS,
Wollongong Univ. (Australia). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04884

LIMNOLOGY OF SHALLOW WATERS, SYMPOSIA BIOLOGICA HUNGARICA, VOL. 15,
For primary bibliographic entry see Field 5C.
W78-04927

PRELIMINARY DATA ON THE DYNAMICS OF PHYTOPLANKTON DEVELOPMENT IN FISH-BREEDING PONDS OF THE ARARAT PLAIN, (IN RUSSIAN),
A. A. Arutyunyan.
Biol Zh Arm 28(7), p 98-101, 1975.

Descriptors: Algae, Ararat Plain(USSR), Biomass, Breeding, *Carp, Fish, Plankton, Ponds, *Trout, *Phytoplankton.

A study was made of the quantitative and qualitative composition of phytoplankton and the intensity of its development in carp and trout breeding ponds in March-Nov. 1971-1972 and March-Sept. 1973. During the vegetative period 32 genera of algae were found. The phytoplankton of the ponds in the fall was characterized by a decrease of biomass, but its qualitative composition remained unchanged.
W78-04946

SOLUTION, DIFFUSION AND SORPTION IN THE UPPER LAYER OF LAKE SEDIMENTS: V. THE DIFFERENTIATION OF THE PROFUNDAL SEDIMENTS OF AN OLIGOTROPHIC MOUNTAIN LAKE (FELDSEE, HOCHSCHWARZWALD) BY SEDIMENT WATER INTERACTION, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Inst.
For primary bibliographic entry see Field 5B.
W78-05015

ASSESSMENT OF FLOOD AND EROSION ASSISTANCE PROGRAMS, RONDEAU COASTAL ZONE EXPERIENCE, LAKE ERIE,
Waterloo Univ. (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 4A.
W78-05037

THE ROLE OF VEGETATION IN STABILIZING THE LOWER GREAT LAKES CANADIAN SHORELINE,
Acres Consulting Services Limited, Niagara Falls (Ontario). Environmental Dept.
For primary bibliographic entry see Field 4D.
W78-05038

NUTRIENTS AND PRODUCTIVITY AS INDICATIONS OF THERMAL EFFLUENT-UPWELLING INTERACTIONS IN LAKE MICHIGAN,
Argonne National Lab., IL.
For primary bibliographic entry see Field 5C.
W78-05039

PSEUDO-LAGRANGIAN DISPERSION ESTIMATES FROM CURRENT METERS,
Ontario Ministry of the Environment, Toronto. Water Resources Branch.
M. D. Palmer.
Journal of Great Lakes Research, Vol 3, No 1-2, p 106-112, October 1977. 7 fig, 3 tab, 20 ref.

Descriptors: *Dispersion, *Currents(Water), *Current meters, *Lake Ontario, Correlation analysis, Analytical techniques, Measurement, Lakes, Coasts, Circulation, Water circulation, Data processing, Limnology, Path of pollutants, Lagrangian processes, Pseudo-Langrangian correlation, Auto-correlation functions, Current-meter records.

A method for computing the Pseudo-Lagrangian auto-correlation function from three concurrent current meter records was discussed. The current meters were separated by approximately 400 m parallel-to-the-bottom contours, 2.4 m above the bottom where the water depth is 11.6 m. Integrating the Pseudo-Lagrangian auto-correlation function, the dispersion coefficients perpendicular to the bottom contours ranged from 3700 sq cm/sec at one hour to 100000 sq cm/sec at 10 hours and parallel to the bottom contours from 52000 sq cm/sec at one hour to 120000 sq cm/sec at 10 hours. Dispersion parallel to the bottom grows with time at a rate 1/3 of the growth rate perpendicular to the bottom contours. Integral space scales determined from the Pseudo-Lagrangian auto-correlation functions have a mean value of 185 and 150 m parallel and perpendicular to the depth contours respectively. The ratio of the Lagrangian and Eulerian scales was found to be between 1.6 and 1.0. (Sims-ISWS)
W78-05040

THERMAL WEDGING IN LAKE MACATAWA, MICHIGAN: LONG-TERM IMPACT OF CHANNELIZATION,
Rice Univ., Houston, TX. Dept. of Geology.
J. B. Anderson, and B. Broekstra.
Journal of Great Lakes Research, Vol. 3, No. 1-2, p 159-163, October 1977. 7 fig, 1 tab, 6 ref. NSF GY-11151.

Descriptors: Lakes, *Lake Michigan, *Water circulation, *Channeling, Coasts, Temperature, Water temperature, Turbidity, Sediments, Upwelling, Winds, Measurement, Surveys, Limnology, *Michigan, Water pollution sources, *Lake Macatawa(Mich), *Thermal wedging(Lakes), Coastal lakes.

Bottom wedging of cold Lake Michigan waters into Lake Macatawa, Michigan, through a connecting ship channel occurs frequently during summer months and results from upwelling in Lake Michigan. This thermal wedging causes sporadic flushing of sediment-laden waters into Lake Michigan, pronounced artificial stratification in Lake Macatawa which may lead to anoxic bottom conditions, and pronounced drops in bottom temperature. Since Lake Macatawa, like many other coastal lakes and rivers located along the Great Lakes, has been connected to Lake Michigan via an artificial ship channel, the process of thermal wedging is an unnatural one. Influences of thermal wedging upon the lake environment should be considered in evaluating the long-term effect of channel construction. (Sims-ISWS)
W78-05041

LAKE ERIE BEGINNING-OF-MONTH WATER LEVELS AND MONTHLY RATES OF CHANGE OF STORAGE,
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 4A.
W78-05048

EXPERIENCE IN THE REPLACEMENT OF REED AND CATTAIL THICKETS WITH BROAD-LEAVED RICE IN SHALLOWS OF THE KREMENCHUG RESERVOIR, (IN RUSSIAN),
Ministry of Water Conservation Ukranian SSR, Cherkassy (USSR). Hydrogeological Expedition.
M. S. Tryasova.
Gidrobiol Zh 12(4), p 86-88, 1976.

Descriptors: *Rice(Broad-leaved), *Cattail, Fodder, *Kremenchug Reservoir(USSR), *Reed, Reservoirs, Shallows, Thickets, Ukranian-SSR, USSR.

To test the possibility of more effectively using the shallow waters of the Kremenchug Reservoir (Ukranian SSR, USSR) for raising livestock fodder plants, an attempt was made to replace reed and cattail thickets with Zizania latifolia. The rice was planted in the spring (rootstock cuttings) or summer (shoots) on tilled or untilled soil with or without cutting back of renewed reed and cattail shoots. As a result of cutting back, pure rice thickets with a height of up to 2.85 m and a stem density of up to 85/m2 were formed. The average yield of green mass in the 2nd vegetation period was 250-450 centners/ha.--Copyright 1977, Biological Abstracts, Inc.
W78-05063

MATHEMATICAL MODEL OF LAKE FISH COMMUNITY, (IN RUSSIAN),
Vologodskii Gosudarstvennyi Pedagogi-Cheskii Inst. (USSR).
L. A. Zhakov, and V. V. Menshutkin.
Vopr Ikhtiol. 14(3), p 387-395, 1974.

Descriptors: *Computer models, Fish food, Lakes, *Mathematical models, Russian-SFSR, USSR, Fish populations.

A mathematical model of a lake fish community was created and implemented on a digital computer. The model takes into account the food relationships of the fish populations and abiotic factors. The structure and dynamics of fish communities as a function of the food and hydrochemical characteristics of lakes of the Vologada district of the Russian SFSR (USSR) was investigated. The proposed model can be used for solving problems related to the exploitation of fishes of lakes or reservoirs.--Copyright 1975, Biological Abstracts, Inc.
W78-05064

STATISTICAL DISTRIBUTION OF THE RESULTS OF RIVER ZOOPLANKTON SAMPLINGS (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii, Inst. Ozernogo i Rechnogo Rybnogo Khozyaistva, Saratov (USSR).
S. G. Kornilov, and V. P. V'Yushkova.
Zool Zh 55(4), p 600-601, 1976.

Descriptors: *Distribution, Plankton, Rivers, *Samplings, *Statistical methods, *Zooplankton, *Volgograd water reservoir(USSR).

The hypothesis of lognormal distribution of freshwater zooplankton densities was tested by the analysis of 1388 samples collected in the Volgograd Water Reservoir (Russian SFSR, USSR). Calculations carried out for samples collected every month (for several years) basically confirmed by hypothesis.--Copyright 1977, Biological Abstracts, Inc.
W78-05065

A 96-HOUR SEDIMENT BIOASSAY OF DULUTH AND SUPERIOR HARBOR BASINS (MINNESOTA) USING HEXAGENIA LIMBATA, ASELLUS COMMUNIS, DAPHNIA MAGNA, AND PIMEPHALES PROMELAS AS TEST ORGANISMS,
Heidelberg Coll., Tiffin, OH. River Studies Lab.

For primary bibliographic entry see Field 5A.
W78-05066

ALGOLOGIC STUDY OF THE PEAT BOGS OF TURNHOUT (ANTW.), (IN DUTCH),
Ghent Rijksuniversiteit (Belgium). Lab. voor Systematiek Morfologie.
A. Caljon.
Biol Jaarb 43, p 90-115, 1975.

Descriptors: *Algologic studies, Antwerp(Belgium), *Bogs, *Chlamydomonas, Desmids, Peat bogs, *Turnhout(Belgium), Schroevers formula.

Thirteen bogs in the neighborhood of Turnhout (Antwerp, Belgium) were studied, Qualitatively the algal population is dominated by desmids, with about 50 taxa; quantitatively the genus Glamydomonas is the most important. The biological value of the different waters was calculated using the adapted formula of Schroevers (1970).--Copyright 1977, Biological Abstracts, Inc.
W78-05067

STRUCTURE OF POPULATIONS OF THE DOMINATING BENTHIC ORGANISMS OF LAKE DUSYA: 2. CHIRONOMUS ANTHRACINUS ZETT. IN 1969-1972, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius Inst. Zoologii i Parazitologii.
A. I. Grigyalis.
Liet Tsr Mokslu Akad Darb Ser C Biol Mokslai 1, p 95-102, 1975.

Descriptors: Biomass, *Chironomus-anthracinus, Dominating organisms, Hydrachnellae, Lakes, Lithuanian-ssr, USSR, Lake Dunya(USSR), Zoobenthos.

In 1969-1971 the larvae of C. anthracinus Zett. was important in the zoobenthos of Lake Dusia South Lithuania (USSR, the maximum depth of which is 32.4 m and the mean, 14.7 m. At the end of 1966 the number of larvae was 44 individuals/m2 (33.33%) and the biomass. 0.09 g/m2 (16.98%). In 1967 many samples were without larvae. In the 1st half of 1968 the number of larvae increased to 733 individuals/m3 and their biomass to 13.62 g/m2. Afterwards they decreased to 222 individuals/m2 (4.17g/m2). Female chironomids (100%) were infected by Hydrachnellae (group Tromibidiformes) male, 60% (June 21, 1971). Investigations of the biology of C. anthracinus show that the cycle of development is 2 yr and 1 generation.--Copyright 1976, Biological Abstracts, Inc.
W78-05074

EFFECTS OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION AND MORPHOLOGY OF VICTORELLA PAVIDA (ECTOPROCTA) IN LAKE PONTCHARTRAIN, LOUISIANA, AND VICINITY,
New Orleans Univ., LA. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W78-05075

INFLUENCE OF A PULP AND PAPER MILL EFFLUENT ON ASPECTS OF DISTRIBUTION, SURVIVAL AND FEEDING OF NIPIGON BAY, LAKE SUPERIOR, LARVAL FISH,
Fisheries and Marine Service, Ottawa (Ontario). Great Lakes Biolimnology Lab.; and Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W78-05076

ON THE FAUNA AND FLORA IN LAKE KAWAGUCHI IN SUMMER, (IN JAPANESE),
For primary bibliographic entry see Field 5C.
W78-05080

ENVIRONMENTAL CHEMISTRY OF COPPER IN TORCH LAKE, MICHIGAN,
Texas Univ. at Dallas, Richardson. Center for Environmental Studies.
For primary bibliographic entry see Field 5B.
W78-05081

THERMAL STABILITY AND PHYTOPLANKTON IN VOLTA LAKE, GHANA,
Nigeria Univ., Nsukka (Nigeria).
For primary bibliographic entry see Field 5C.
W78-05088

THE INFLUENCE OF SUBMERSED AQUATIC PLANTS ON TEMPERATURE GRADIENTS IN SHALLOW WATER BODIES,
Guelph Univ., (Ontario). Dept. of Botany and Genetics.
H. M. Dale, and T. J. Gillespie.
Canadian Journal of Botany, Vol. 55, p 2216-2225, 1977. 1 fig, 5 tab, 22 ref.

Descriptors: *Submerged plants, *Water temperature, *Thermal stratification, *Biomass, *Plant growth, Aquatic plants, Rooted aquatic plants, Pondweeds, Standing crop, Climatology, Solar radiation, Wetlands, Depth, Aquatic environment, Shallow water, Productivity, Growth rates, Biological communities, Plant populations, Lakes, *Lake Opinicon(Ontario Canada).

Field studies examined temperature gradients during similar weather conditions in stands of aquatic macrophytes of varying standing crop sizes. The gradient at midday from 10 cm below the water surface to soil, in clear weather in August, was 32 C degrees/m in shallow water where there was a large macrophyte biomass and only 0.2 C degrees/m in deeper water with few plants. There was a direct correlation between the log of the biomass per cubic meter and the steepness of the gradient. The gradient results from light/heat interception by upper leaf material, shading of the soil substrate, and reduction of water currents. Macrophyte populations of different species had varying gradients under laboratory studies examining the influence of seasonal changes in incoming radiation, wind velocity, and air temperatures. Significant changes were shown in the extent in which growth and development of the macrophyte populations were affected by the gradient they cause, mainly from the contrast of low temperatures at the base of the plant versus the diurnal fluctuations at the top plus the concomitant changes in such factors as gas solubility. (Steiner-Mass)
W78-05091

WETLAND INVENTORY, ONEIDA COUNTY, NEW YORK,
Oneida County Environmental Management Council, Utica, NY.
For primary bibliographic entry see Field 6G.
W78-05099

WATER QUALITY EVALUATION OF A LOWER POOL ELEVATION FOR PROPOSED ARCADIA LAKE, OKLAHOMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5B.
W78-05107

BIOLOGICAL SURVEY OF WILSON RESERVOIR - SALINE RIVER, KANSAS, AUGUST 1970,
Environmental Protection Agency, Cincinnati, OH. Div. of Field Investigations.
For primary bibliographic entry see Field 5C.
W78-05109

AN INVESTIGATION OF THE NEARSHORE REGION OF LAKE ONTARIO IFYGL.
State Univ. of New York Coll. at Buffalo.
For primary bibliographic entry see Field 5C.
W78-05113

EFFECTS OF THERMAL EFFLUENT AND MACROPHYTE HARVESTING ON THE BENTHOS OF AN ALBERTA LAKE,
For primary bibliographic entry see Field 5C.
W78-05115

LIMITING NUTRIENTS AND MAXIMUM GROWTH RATES FOR DIATOMS IN NARRAGANSETT BAY,
Trondheim Univ. (Norway). Biological Station.
For primary bibliographic entry see Field 5C.
W78-05117

DETERMINATION OF PRIMARY PRODUCTIVITY AND COMMUNITY METABOLISM IN STREAMS AND LAKES USING DIEL OXYGEN MEASUREMENTS,
Geological Survey, Bay Saint Louis, MS. Water Resources, Div.; and National Aeronautics and Space Administration, Bay Saint Louis, MS. National Space Technology Labs.
For primary bibliographic entry see Field 5C.
W78-05119

REMOTE SENSING ANALYSIS OF LAKE LIVINGSTON AQUATIC PLANTS, 1975 FINAL REPORT,
Texas A and M Univ., College Station. Remote Sensing Center.
For primary bibliographic entry see Field 5A.
W78-05134

PRELIMINARY BIOCHEMICAL OBSERVATIONS OF FISHES INHABITING AN ACIDIFIED LAKE IN ONTARIO, CANADA,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5A.
W78-05159

DEMONSTRATION OF THE ACTIVITY OF MUREINE HYDROLASE DURING THE BREAKDOWN OF A BLOOM OF ANABAENA SOLITARIA KLEB, (IN GERMAN),
Tuebingen Univ. (West Germany). Inst. fuer Chemische Pflanzenphysiologie.
For primary bibliographic entry see Field 5C.
W78-05160

DISTRIBUTION OF PURPLE PHOTOSYNTHETIC BACTERIA IN WETLAND AND WOODLAND HABITATS OF CENTRAL AND NORTHERN MINNESOTA,
Minnesota Univ., St. Paul. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W78-05168

2I. Water In Plants

COMPARATIVE STUDIES ON WATER UPTAKE AND WATER PERMEABILITY OF POTATO TISSUE UNDER THE EFFECT OF INDOLEACETIC ACID, CHLORAMPHENICOL AND ACTINOMYCIN D,
Istanbul Univ. (Turkey). Dept. of General Botany.
N. Onder.
Physiol Plant. 31(1), p1-3, 1974.

Descriptors: *Absorption, *Permeability(Plant tissue), *Potatoes, *Indoleacetic acid, *Actinomycin D, *Chloramphenicol, Solanum-tuberosum.

The water uptake of potato (Solanum tuberosum) tuber tissue under the influence of chloramphenicol and actinomycin D was compared with that of IAA. Both antibiotics decreased the water absorption as compared to the effect of indoleacetic acid. This decrease, in the early hours (3-6h), is due to diminished water permeability. In the later period (6-48h), it is instead a result of a reduction in wall extensibility. --Copyright (c) 1975, Biological Abstracts, Inc.
W78-04796

A STUDY ON PERIPHYTON OF PO RIVER WITH ARTIFICIAL SUBSTRATA, (IN ITALIAN),
C. Gemelli, and Z. Zullini.
Ateneo Parmense Acta Nat 12(2), p 111-122, 1976.

Descriptors: *Periphyton, *Artificial substrata, Chondrostoma-soetta, *Food chains, Italy, Leuciscus-cephalus, Limnodrilus-spp, *Po River(Italy), Temperature *Tubifex-tubifex.

The periphytic fauna living in a stretch of the Po river near Piacenza (Italy) was studied by means of artificial substrata consisting of plexiglass slides measuring 15 X 15 cm. Every 40 days such substrata were analyzed and replaced, the whole study lasting 16 mo. The river community of the studied area is poor in species, the main food chain being; organic sediment Tubifex tubifex and Limnodrilus spp. Leucisus cephalus and Chondrostoma soetta. On the artificial substrata a relatively high number of species, difficult to find other wise, was found. Densities of the more important groups of animals are presented as individuals/m2 of substratum area in various months of 2 yr. The monthly mean temperature of the water, measured automatically and continously and the productivity of periphyton (in mg/dm2, day) are given as dry weight and as ash weight. --Copyright (c) 1977, Biological Abstracts, Inc.
W78-04798

THE WATER RELATIONS OF HEMLOCK (TSUGA CANADENSIS): IV. THE DEPENDENCE OF THE BALANCE PRESSURE ON TEMPERATURE AS MEASURED BY THE PRESSURE-BOMB TECHNIQUE,
Toronto Univ. (Ontario). Dept. of Botany.
M. T. Tyree, J. Dainty, and D. M. Hunter.
Can J Bot. 52(5), p 973-978, 1974.

Descriptors: *Balance pressure, *Hemlock, Osmotic pressure(Plants), Plasmolysis, *Plant growth, Technique, *Temperature dependence(Plants), *Tsuga-canadensis, Turgor.

The temperature dependence of the balance pressure is reported for shoots of T. canadensis at constant volume, i.e., when water is neither added to nor removed from the shoot. Since the balance pressure closely equals minus the water potential, the temperature dependence of the balance pressure should reflect the combined temperature dependence of the osmotic and turgor pressures. Both the osmotic and the tugor pressures decline with decreasing temperature; frequently the turgor pressure declines 2-3 times more rapidly than the osmotic pressure, causing the balance pressure to rise with decreasing temperature. Only when the turgor pressure is zero (only beyond incipient plasmolysis) does the temperature dependence of the balance pressure closely follow the temperature dependence of the osmotic pressure; this occurs when the balance pressure equals or exceeds 24 bars. (See also W75-11900-W75-11902)--Copyright 1974, Biological Abstracts, Inc.
W78-04800

MODELING SOIL WATER MOVEMENT INTO PLANT ROOTS,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2D.
W78-04843

QUANTITY AND QUALITY CONSIDERATIONS FOR WATER USE EFFICIENCY IN IRRIGATION,
Texas Tech Univ., Lubbock. Dept. of Plant and Soil Science; and Texas Tech Univ., Lubbock. Dept. of Biological Sciences.
For primary bibliographic entry see Field 3F.
W78-05054

INVESTIGATIONS ON THE ABUNDANCE, THE BIOMASS AND THE CALORIC EQUIVALENTS OF THE MACROBENTHOS IN A WOODLAND BROOKLET, (IN GERMAN),
Bonn Univ. (West Germany). Inst.fuer Landwirtschaftliche Zoologie und Bienekunde.
N. Caspers.
Int Rev Gesamten Hydrobiol 60(4), p 557-566, 1975.

Descriptors: *Benthos, *Biomass, Brooklet, Caddis-fly, Carbon-14, East Germany, Food, Gammarus-fossarum, Invertebrates, Leptophlebia-marginata, *Primary productivity, Trees, Woodlands, Streams.

From 1972-1974 the invertebrates of a woodland-brooklet of the 'Naturpark Kottenforst-Ville' (Rhineland) (East Germany) were investigated concerning abundance and standing crop at selected sampling stations of the 'epirithron'. In the shaded brooklet the allochthonous autumn-shed leaves were the most important food for the aquatic invertebrates. C-14 radio-isotope tags were used to get data on the primary productivity of the periphyton community, which is less important for the energy balance of the macro-benthic organisms. The most frequent macro-consumers are Gammarus fossarum Koch, Leptophlebia marginata L. and some caddis larvae which feed directly on detritus and decomposing leaves.
W78-05069

EFFECT OF VARIOUS ECOLOGICAL CONDITIONS OF PONDS ON THE REPRODUCTIVE SYSTEM OF THE SILVER CARP, (IN RUSSIAN),
Zh. G. Sarsembaev.
Izv Akad Nauk Kaz Ssr Ser Biol 13(4), p 31-38, 1975.

Descriptors: *Carp, Climates, *Ecological conditions, Foods, *Growth rates, Silver carp, Temperature, *Reproduction.

Histological analyses were made of the gonads of the silver carp cultivated in different regions. The rate of development of the gonads on the temperature regime of the ponds and the fecundity depends on the food base. The problem of the relationship between the growth rate and the rate of development of the reproductive system is examined. A direct relationship between these indices is observed when a high water temperature is combined with a good food base. A change of any of these factors disturbs the relation between growth rate and rate of development of the gonads. Regions most suitable climatically for breeding silver carp are recommended.
W78-05070

THE VEGETATION OF BRITISH INLAND SALT MARSHES,
Manchester Univ. (England) Dept. of Botany.
J. A. Lee.
Journal of Ecology, Vol. 65, p 673-698, 1977. 7 fig, 7 tab, 25 ref, append.

Descriptors: *Salt marshes, *Halophytes, *Vegetation establishment, *Inland waterways, *Spring waters, Wetlands, Marshes, Marsh plants, Plant groupings, Brines, Springs, Saline water, Salts, Dominant organisms, Environmental effects, Plant populations, *Inland salt marshes, Field farm, Brine springs.

A survey of the vegetation of the major inland saline sites in Britain is presented. Marshes are associated either with brine springs from the Keuper Saliferous Beds or with the exploitation of the beds by the salt industry. Areas around brine springs are relatively little disturbed, and are largely colonized by perennial halophyte species. Vegetation of the most important brine-spring site, Fields Farms, is described and analysed by association-analysis. The thirteen groupings produced are used to construct a vegetation map of the marsh. The vegetation at Fields Farm is compared with other British and North European brine-spring habitats. Saline sites created in the Twentieth century are more numerous than the brine-spring sites. However, they have often been formed away from the immediate vicinity of brine springs, and have been colonized by a limited number of annual and short-lived perennial halophytes. A phytosociological survey of these recently-created sites showed that the vegetation could be referred to four associations already recognized from inland salt marshes on the continent. The vegetation of inland saline sites in Britain has close affinities with coastal vegetation, but is poorer in species. (Steiner-Mass)
W78-05100

IMPACT OF WATER LEVEL CHANGES ON WOODY RIPARIAN AND WETLAND COMMUNITIES. VOLUME I: PLANT AND SOIL RESPONSES TO FLOODING,
Missouri Univ.-Columbia. School of Forestry, Fisheries and Wildlife.
For primary bibliographic entry see Field 6G.
W78-05101

IMPACT OF WATER LEVEL CHANGES ON WOODY RIPARIAN AND WETLAND COMMUNITIES. VOLUME II: THE SOUTHERN FOREST REGION,
Missouri Univ.-Columbia. School of Forestry, Fisheries and Wildlife.
For primary bibliographic entry see Field 6G.
W78-05102

IMPACT OF WATER LEVEL CHANGES ON WOODY RIPARIAN AND WETLAND COMMUNITIES. VOLUME III: THE CENTRAL FOREST REGION,
Missouri Univ.-Columbia. School of Forestry, Fisheries and Wildlife.
For primary bibliographic entry see Field 6G.
W78-05103

2J. Erosion and Sedimentation

NON-POINT SOURCE POLLUTION SEMINAR, SECTION 108(A) DEMONSTRATION PROJECTS PROGRESS REPORTS, HELD AT CHICAGO, NOVEMBER 20, 1975. POLLUTION CONTROL IN GREAT LAKES.
Environmental Protection Agency, Chicago, IL. Office of the Great Lakes Coordinator.
For primary bibliographic entry see Field 5G.
W78-04719

STREAM STABILIZATION,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-04728

SEDIMENT TRAP MEASURING BED LOAD MOVEMENT IN BLACK CREEK,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-04729

COMPARATIVE INTERSTITIAL WATER AND SEDIMENT CHEMISTRY IN OLIGOTROPHIC AND MESOTROPHIC LAKES, MAINE, U.S.A.,
For primary bibliographic entry see Field 5C.
W78-04774

LAKE GEOCHEMISTRY IN THE KAMINAK LAKE AREA, DISTRICT OF KEEWATIN, N.W.T.,
For primary bibliographic entry see Field 2H.
W78-04809

COMPETENCE OF HOPE RIVER, JAMAICA: A REAPPRAISAL OF R AS A FUNCTION OF D,
University of the West Indies, Kingston (Jamaica). Dept. of Geology.
P. A. Wood.
Water Resources Research, Vol 13, No 6, p 1013-1014, December 1977. 2 fig, 3 ref.

Descriptors: *River flow, *Shear stress, *On-site investigations, *Hydraulic radius, Hydraulics, Depth, Tractive forces, Water levels, Particle size, Bed load, *Sediment transport, Foreign research, Foreign countries, *Jamaica, *Hope River(Jamaica).

Shear stress and competence determinations for the Hope River, Jamaica, indicated that widely different values are obtained with different equations. Field measurements of hydraulic radius, R, depth, D, and slope, S, of the energy gradient were undertaken at a study section so that shear stress could be determined. The data suggested that for multichannel streams, R can be approximated by D/2, so that shear stress = specific weight times (D/2)S. (Humphreys-ISWS)
W78-04837

WIND EROSION RESEARCH ACCOMPLISHMENTS AND NEEDS,
Agricultural Research Service, Big Spring, TX.
D. W. Fryrear, and L. Lyles.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 5, p 916-918, September-October 1977. 51 ref.

Descriptors: *Wind erosion, *Reviews, *Soil erosion, Erosion, Soils, Environment, Environmental effects, Land management, Winds, Research priorities, *Research needs(Wind erosion).

Past wind erosion research has provided many valuable tools for identifying wind erosion losses and practices to decrease the wind erosion hazard. Major needs are the development of soil flux models for predicting erosion from single events, more dependable field wind erosion sampling equipment, identification of the impact of continued erosion on soil productivity, extension of benefit of emergency tillage, and optimization of barrier influence by designing the height-density-spacing of multiple barriers. (Humphreys-ISWS)
W78-04842

SEDIMENT DEPOSITION PATTERNS IN SIMULATED GRASS FILTERS,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-04846

FLOW CHARACTERISTICS IN LOCAL SCOUR AT BRIDGE PIERS,
Auckland Univ. (New Zealand). School of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-04849

A GUIDE FOR APPLICATION OF THE COMPUTER PROGRAM FOR THE MODIFIED EINSTEIN METHOD OF COMPUTING TOTAL SEDIMENT DISCHARGE (MODEIN),
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04860

ANALYSIS OF BOTTOM MATERIAL FROM THE WILLAMETTE RIVER, PORTLAND HARBOR, OREGON,
Geological Survey, Portland, OR. Water Resources Div.
For primary bibliographic entry see Field 2K.
W78-04874

RAINFALL PARAMETERS FOR SOIL LOSS ESTIMATION IN A SUBTROPICAL CLIMATE,
Rhodesia Dept. of Conservation and Extension, Salisbury.
For primary bibliographic entry see Field 2G.
W78-04894

A GEOGRAPHICAL APPRAISAL OF THE EXPANSION AND DETERIORATION OF THE INDIAN DESERT,
Central Arid Zone Research Inst., Jodhpur (India).
A. K. Sen, and H. S. Mann.
Annals of Arid Zone Vol 16, No 3, p 281-289, September 1977. 20 ref.

Descriptors: *Deterioration, *Deserts, Dune sands, Weathering, Land use, Drainage patterns(Geologic), Topography, Soil conservation, Geomorphology, Physiography, Terrain analysis, Dune succession, Arid lands, India(Rajasthan), Great Indian Desert(India).

An attempt was made to examine the creep and deterioration of the Indian desert on the basis of some physiographic and topographic parameters. The extents of the great Indian desert and its geographical limits were defined. The creep of the desert was then considered in relation to the increase and decrease of desertic sands, the extent of sand dunes, water table and climatic phenomena, and drainage system and soil. A note on the causes of interior desert deterioration cities the rising of the Himalayas and lowering of the Aravallis, which led to the shifting and desiccation of rivers, and the uplift of the Putwar plateau during the late Pleistocene. Also listed as causes: recent physiographic changes, exploitation of resources, cultivation on dunes and increased salinity of groundwater. (Payton-Arizona)
W78-04932

TSUNAMI INUNDATION PREDICTION,
Hawaii Univ., Honolulu. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 2L.
W78-04966

A STUDY OF BEAUFORT SEA COASTAL EROSION NORTHERN ALASKA,
R. Lewellen.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977. Vol 15. Transport, p 491-528, March 1977. 8 fig, 35 ref.

Descriptors: *Baseline studies, *Resources development, *Erosion, *Hazards, Sedimentation, Geomorphology, Alaska, *Outer Continental Shelf, Beaufort Sea, Pollutant transport.

Rapid erosion and depositional rates are geological hazards to proposed industrial activities. Coastal erosion rates of greater than 20 meters per thaw season were measured. Ironically, the geomorphic form remains essentially the same from season to season; to the untrained observer the erosion appears nil since the form remains relatively constant. Rapid sedimentation and aggradation can trigger rapid permafrost aggradation, soil heave, and related phenomena. The study determined that it is impossible: (1) to indicate where coastal morphology is likely to be changed by man's activity; (2) to indicate the relative erosional susceptibility of the different coastal geomorphic areas; and (3) to evaluate the effects of coastal morphology changes which are man induced. The variations encountered were complex and interrelated with other complex factors. No specific guides or formulas will satisfy the entire Beaufort Sea coast. However, the study did determine that specific sites can be studied adequately from the existing data bases for problem solutions or for determining what specific field work will be required. (Sinha-OEIS)
W78-04995

HYDROLOGY AND SEDIMENTOLOGY OF THE COLORADO RIVER IN GRAND CANYON,
Arizona Univ., Tucson. Dept. of Ecology and Evolutionary Biology.
M. Laursen, and E. Silverston.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 735, Price codes: A03 in paper copy, A01 in microfiche. National Park Service, Grand Canyon National Park Report Series, Colorado River Research Program, Technical Report No. 12, Dec 1976. 27 p, 18 fig, 3 ref.

Descriptors: Photography, Beach erosion, Beaches, Monitoring, Environmental effects, Camp sites, Sedimentology, Deposition(Sediments), *Sediment transport, Sedimentation rates, Streams, Testing, Hydraulic models, Hydrologic models, National Parks, *Colorado River, *Arizona, *Recreation facilities, *Grand Canyon National Park, Lake Powell, Lee's Ferry area.

Photographic studies conducted to evaluate beach changes in the Lee's Ferry Area of the Colorado River showed extensive beach and river bed degradation which will probably proceed downstream at the rate of one mile per year. This is a result of Lake Powell acting as an enormous super-efficient sand trap, plus loss of sediment flow to beaches caused by river bed degradation. The controlled flow from Glen Canyon Dam is less able to remove boulders from the existing stream areas which may affect rapids. A laboratory experiment was conducted in order to simulate and more carefully evaluate the stream effects. (Payton-Arizona)
W78-05002

ALTERATIONS OF TERRACE DEPOSITS AND BEACHES OF THE COLORADO RIVER IN GRAND CANYON,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
A. D. Howard, and R. Dolan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 766, Price codes: A03 in paper copy, A01 in microfiche. National Park Service, Grand Canyon National Park Report Series, Colorado River Research Program, Final Report, Technical Report No. 7, July 1976. 29 p, 4 tab, 7 fig, 7 ref.

Descriptors: Sediments, *Beach erosion, Recreation, *Recreational facilities, *Colorado River, Flow control, Alteration of flow, Environmental sanitation, Runoff, Wind erosion, Projections, *Arizona, National Parks, Environmental effects, Recreation wastes, *Camp sites, Beaches, Glen Canyon Dam, *Grand Canyon National Park, Human impact.

The beaches along the Colorado River are being significantly altered by wind and side canyon runoff as well as by human usage. Since the completion of the Glen Canyon Dam, these beaches are not being replenished periodically as they are now positioned well above the high-water stage. As a

result, the predominant eolian process is diminishing the number of campable beaches. This process is further aggravated by human impact which has caused destruction or inhibition of the vegatative cover over an appreciable area. The incorporation of human waste and debris into campsites is nearly as serious a problem - leading, at the most heavily camped sites, to a condition in which human waste is incorporated into sand/silt deposits at rates that exceed natural purging capacities. (Payton-Arizona)
W78-05004

MOBILE CONTROLS FOR WATER RESOURCES PROJECTS,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8D.
W78-05024

SEDIMENT FROM DRAINAGE SYSTEMS FOR CLAY SOILS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-05030

WIND EROSION: PROCESSES AND EFFECT ON SOIL PRODUCTIVITY,
Agricultural Research Service, Manhattan, KS. North Central Region.
L. Lyles.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 5, p 880-884, September-October 1977. 1 fig, 6 tab, 29 ref.

Descriptors: *Wind erosion, *Soil erosion, *Crop production, *Great Plains, Erosion, Soils, Movement, Air, Cultivated lands, Topsoil, Soil texture, Soil types, Sediment transport, Sediment yield, Wheat, Sorghum, Crops, Rotation, Corn(Field), Erosion processes.

Part one of this report concerned basics of the erosion process in terms of particle dynamics, threshold conditions, particle flux, and the protective role of nonerodible elements. Part two was a procedure for evaluating wind erosion effects on soil loss and, subsequently, on crop yields. In the procedure, a wind-erosion equation was used to predict potential annual loss, which was converted to crop-yield reduction per cm of erosion for wheat, grain sorghum, and corn. Where applied in the Oklahoma Panhandle, the procedure resulted in estimated annual yield reductions of wheat and grain sorghum equivalent to a total crop failure on about 4,530 ha of the cultivated sandy surface soils in the selected area. Wind erodes land every year in the United States, especially in the Great Plains and Far West and where there are coastal sands, organic soils, and interior sandy soils. Additional research on 'benchmark' soils of the Great Plains in controlled studies should be directed toward obtaining precise yield-soil thickness data. Data also are needed on distribution of soils by wind erodibility groups (WEG) and land use plus crop distributions according to WEG on cultivated land on a county or land resource area basis for areas susceptible to wind erosion. (Humphreys-ISWS)
W78-05031

FINE PARTICULATE EMISSIONS DUE TO WIND EROSION,
National Center for Atmospheric Research, Boulder, CO.
D. A. Gillette.
Transactions of the American Society of Agricultural Engineers, Vol 20, No 5, p 890-897, September-October 1977. 5 fig, 2 tab, 18 ref, 1 append.

Descriptors: *Soil erosion, *Dusts, *Wind erosion, *On-site tests, *Texas, On-site investigations, Movement, Settling velocity, Suspension, Testing procedures, Soil texture, Wind velocity, Weathering, Mineralogy, Soils, Air pollution, Suspended solids, Particle size, Distribution, Dust generation, Airborne dust.

The ratios of emission of fine particles (d less than 0.02 mm) by wind erosion to total soil movement were measured and related to empirical Agricultural Research Service (ARS) work relating total soil movement to wind and soil parameters. Ratios of fine particulate emission to total soil movement are a function of soil texture, wind speed, mineralogy, and possibly soil moisture-wind history. Fine particles are produced by the sandblasting effect of saltation, which acts to disaggregate fine particles on the surfaces of larger particles and to emit fine particles by 'splashing' of the saltating particle into a reservoir of fine particles. Fine-testured soils tend to emit more fine particles upon unit soil movement unless the structure of the soil aggregates is highly resistant to breakage. Total soil movement measurements show good agreement with values computed from formulas derived from ARS studies and from data herein reported. It was concluded that the ratio of fine particle emission to total soil movement is dependent on soil texture, windspeed, mineralogy, and possibly physical weathering. (Humphreys-ISWS)
W78-05032

SEDIMENT YIELD PREDICTION BASED ON WATERSHED HYDROLOGY,
Agricultural Research Service, Temple, TX.
For primary bibliographic entry see Field 4D.
W78-05036

THERMAL WEDGING IN LAKE MACATAWA, MICHIGAN: LONG-TERM IMPACT OF CHANNELIZATION,
Rice Univ., Houston, TX. Dept. of Geology.
For primary bibliographic entry see Field 2H.
W78-05041

DECREASE IN HARBOR MAINTENANCE DREDGING THROUGH THE USE OF PILE DIKES AND RELATED STRUCTURES TOGETHER WITH AN ANALYSIS OF ESTUARINE SEDIMENTATION PROBLEMS,
Naval Academy Annapolis, MD. Dept. of Oceanography.
For primary bibliographic entry see Field 8B.
W78-05050

NOTES ON SEDIMENTATION ACTIVITIES, CALENDAR YEAR 1974.
Water Resources Council, Washington, DC. Sedimentation Committee.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-252 377, Price codes: A14 in paper copy, A01 in microfiche. Report, 1974. 320 p, 1 fig, 4 tab, 2 append.

Descriptors: *Sedimentation, *Research and development, *Projects, Research facilities, Federal government, Sediment transport, Suspended solids, Erosion, Sedimentation rates, Sediments, Sedimentology, Reviews.

Information is presented which was furnished by Federal agencies conducting sedimentation investigations on (1) work in progress or planned, (2) important findings, on new methods, (3) new publications and (4) laboratory and other research activities. The material is organized by major drainage regions in the conterminous United States, Alaska, Hawaii, Puerto Rico, and foreign. Major headings includes Laboratory and Other Research Activities. An excerpt from the Catalog of Information on Water Data, Index to Water Quality Stations, 1974 edition, compiled by the Geological Survey, Office of Water Data Coordination, is included. this excerpt is a list, as of January 1974, of long-term (3 years or more) water quality sites at which sediment data have been collected. Agency addresses by departments where information on agency activities can be obtained are listed. (See also W74-04916 and W70-10318) (Froehlich-ISWS)
W78-05057

MERCURY DISPERSAL FROM LODE SOURCES IN THE KUSKOKWIM RIVER DRAINAGE, ALASKA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 5B.
W78-05060

INTERACTIONS BETWEEN ZINC AND SUSPENDED SEDIMENTS IN THE FRASER RIVER ESTUARY, BRITISH COLUMBIA,
British Columbia Univ., Vancouver. Dept. of Geological Sciences.
For primary bibliographic entry see Field 5A.
W78-05061

LEAD CONCENTRATIONS IN ALGAE AND PLANTS GROWN OVER LEAD CONTAMINATED SEDIMENTS TAKEN FROM SNOW DUMPS IN OTTAWA, CANADA,
Ottawa Univ. (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-05071

ENVIRONMENTAL CHEMISTRY OF COPPER IN TORCH LAKE, MICHIGAN,
Texas Univ. at Dallas, Richardson. Center for Environmental Studies.
For primary bibliographic entry see Field 5B.
W78-05081

2K. Chemical Processes

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE WATER: PART II, SOIL PHYSICAL AND CHEMICAL CHANGES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-04705

THE KINETICS OF MINERAL DISSOLUTION IN CARBONATE AQUIFERS AS A TOOL FOR HYDROLOGICAL INVESTIGATIONS, II. HYDROGEOCHEMICAL MODELS,
Tahal-Water Planning for Israel Ltd., Tel Aviv.
For primary bibliographic entry see Field 2F.
W78-04716

SUBSTANTIVE CORRECTIONS TO SIL COMMUNICATIONS (IVL MITTEILUNGEN) NUMBERS 6 AND 20,
Wisconsin Univ.-Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 2H.
W78-04810

LONG TERM PEACE RIVER CHARACTERISTICS AS A MEASURE OF A PHOSPHATE SLIME SPILL IMPACT,
University of South Florida, Tampa. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04850

GROUND-WATER RESOURCES OF POSEY COUNTY, INDIANA,
Geological Survey, Mineola, NY. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04862

SURFACE-WATER AND GROUND-WATER FEATURES, CLAY COUNTY, FLORIDA,
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-04870

ANALYSIS OF BOTTOM MATERIAL FROM THE WILLAMETTE RIVER, PORTLAND HARBOR, OREGON,
Geological Survey, Portland, OR. Water Resources Div.
S. W. McKenzie.
Open-file report 77-740, 1977. 8 p, 5 tab, 6 ref.

Descriptors: *Bottom sampling, *Bottom sediments, *Rivers, *Oregon, Data collections, Particle size, Moisture content, Oxygen demand, Chemical analysis, Dredging, Aquatic productivity, *Willamette River(Ore), *Portland Harbor(Ore).

The bottom material of the Willamette River, Portland Harbor, Oregon, was sampled in duplicate on February 1, 1977. Results are reported on the following analyses of the material: immediate and long-term oxygen demand; particle size; percent moisture; residue, loss on ignition; and chemical. The U.S. Geological Survey (USGS), in cooperation with the U.S. Army Corps of Engineers, Portland District (Corps), collected and analyzed duplicate samples of bottom material from Portland Harbor. The analyses were selected jointly by the Corps and USGS and include chemical, oxygen-demand, and particle-size analyses of the bottom material. The National Maine Fisheries Service (NMFS) indicated that, at present, the Columbia River downstream from Bonneville Dam receives very little organic material. The bottom material is 5 to 8 percent organic, and NMFS indicated that this material could stimulate the Columbia River aquatic system, with the dumping sites serving as feeder sites for aquatic organisms. (Woodard-USGS)
W78-04874

SURFACE CHEMICAL PROCESSES IN GROUND-WATER SYSTEMS,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 2F.
W78-04877

SURVEY OF BACTERIA, PHYTOPLANKTON, AND TRACE CHEMISTRY OF THE LOWER COLORADO RIVER AND TRIBUTARIES IN THE GRAND CANYON NATIONAL PARK,
Arizona State Univ., Tempe. Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 5A.
W78-04999

DETERMINATION OF NITRATE BY ANION EXCHANGE WITH ULTRAVIOLET DETECTION,
Iowa State Univ., Ames. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W78-05011

THE USE OF MAGNESIUM CARBONATE IN CHLOROPHYLL DETERMINATIONS,
Geological Survey, Atlanta, GA. National Water Quality Lab.
For primary bibliographic entry see Field 5A.
W78-05029

SOIL SALINITY- FOUR-ELECTRODE CONDUCTIVITY RELATIONSHIPS FOR SOILS OF THE NORTHERN GREAT PLAINS,
Agricultural Research Service, Sidney, MT.
For primary bibliographic entry see Field 2G.
W78-05046

2L. Estuaries

LIGHT-SATURATED PHOTOSYNTHESIS BY PHYTOPLANKTON SIZE FRACTIONS IN THE NEW YORK BIGHT, USA,
Lamont-Doherty Geological Observatory, Palisades, NY.
For primary bibliographic entry see Field 5C.
W78-04738

WATER QUALITY DATA DURING SEPTEMBER 16-19, 1974 AT SILVER BAY, SAWMILL COVE, AND EASTERN CHANNEL, SITKA, ALASKA.
Environmental Protection Agency, Seattle, WA. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5A.
W78-04756

EFFECTS OF CADMIUM, MERCURY, AND SILVER ON MARINE ANIMALS,
National Marine Fisheries Service, Milford, CT. Milford Lab.
For primary bibliographic entry see Field 5C.
W78-04757

EFFECTS OF ENVIRONMENTAL CHANGES ON MARSH VEGETATION WITH SPECIAL REFERENCE TO SALINITY,
Tulane Univ., New Orleans, LA.
For primary bibliographic entry see Field 5C.
W78-04785

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970, INTRODUCTION,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 5C.
W78-04787

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 1, OUTFLOW STUDIES,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 5C.
W78-04788

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 2, PHOSPHATE, NITRATE AND AMMONIUM IN THE ARCHIPELAGO DURING 1970,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 5C.
W78-04789

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 3, DETERMINATION OF TOTAL PHOSPHORUS IN NATURAL WATERS,
Uppsala Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 5B.
W78-04790

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 4, PHYTOPLANKTON DISTRIBUTION IN THE ARCHIPELAGO MEASURED AS CHLOROPHYLL A,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 5B.
W78-04791

ORGANIC CARBON AND DEOXYGENATION IN THE PAMLICO RIVER ESTUARY,
East Carolina Univ., Greenville, SC. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W78-04816

LABORATORY STUDIES OF THE INFLUENCE OF THE VELOCITY OF WIND ON THE MOVEMENT OF OIL SLICKS,
Queen Mary Coll., London (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-04847

DEVELOPMENT OF MODELS FOR PREDICTION OF SHORT-TERM FATE OF DREDGED MATERIAL DISCHARGED IN THE ESTUARINE ENVIRONMENT,
Tetra Tech, Inc., Pasadena, CA.
For primary bibliographic entry see Field 5B.
W78-04854

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. ATLANTIC COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04856

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. GULF COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04857

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. PACIFIC COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04858

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, I. SALINITY VARIATIONS AND ESTIMATION OF RESIDENCE TIME,
Wollongong Univ. (Australia). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04882

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, II. THERMAL BEHAVIOUR,
Wollongon Univ. (Australia). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04883

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, III. DISTRIBUTION OF HEAVY METALS IN SEDIMENTS,
Wollongong Univ. (Australia). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04884

TRACE METALS IN SCALLOPS FROM WITHIN AND AROUND TWO OCEAN DISPOSAL SITES,
Environmental Protection Agency, Narragansett, RI.
For primary bibliographic entry see Field 5C.
W78-04887

TOLERANCE OF ESTUARINE BENTHIC DIATOMS TO HIGH CONCENTRATIONS OF AMMONIA, NITRITE ION, NITRATE ION AND ORTHOPHOSPHATE,
Groningen Rijsuniversiteit (Netherlands). Dept. of Systematic Botany.
For primary bibliographic entry see Field 5C.
W78-04889

THE COMMON MUSSEL MYTILUS EDULIS AS AN INDICATOR OF TRACE METALS IN SCANDINAVIAN WATERS. I. ZINC AND CADMIUM,
Uppsala Univ. (Sweden). Inst. of Zoology.
For primary bibliographic entry see Field 5A.
W78-04890

GROWTH OF THE CARRAGEENAN-PRODUCING TROPICAL RED SEAWEED HYPNEA MUSCIFORMIS IN SURFACE WATER, 870 M DEEP WATER, EFFLUENT FROM A CLAM MARICULTURE SYSTEM, AND IN DEEP WATER ENRICHED WITH ARTIFICIAL FERTILIZERS OR DOMESTIC SEWAGE,
Lamont-Doherty Geological Observatory, Palisades, NY.
For primary bibliographic entry see Field 5C.
W78-04902

ON THE DISTRIBUTION OF PARTICULATE METALS, CHLOROPHYLL AND SESTON IN THE BALTIC SEA,
Biologische Anstalt Helgoland (West Germany).
For primary bibliographic entry see Field 5B.
W78-04904

THE PERSISTENCE OF CHRONICALLY ACCUMULATED HYDROCARBONS IN THE HARD SHELL CLAM MERCENARIA MERCENARIA,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5C.
W78-04905

ZINC AND CADMIUM IN THE PACIFIC HAKE MERLUCCIUS PRODUCTUS OFF THE WESTERN U.S. COAST,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 5C.
W78-04907

DEVELOPMENT OF NORTH SEA COASTAL PLANKTON COMMUNITIES IN SEPARATE PLASTIC BAGS UNDER IDENTICAL CONDITIONS,
Central Lab. TNO., Helder (Netherlands). Dept. of Marine Ecology.
For primary bibliographic entry see Field 5C.
W78-04910

TSUNAMI INUNDATION PREDICTION,
Hawaii Univ., Honolulu. Dept. of Ocean Engineering.
C. L. Bretschneider, and P. G. Wybro.
Sea Grant Reprint No. UNIHI-SEAGRANT-CP-77-02, Reprinted from: Proceedings 15th Coastal Engineering Conference held Honolulu, Hawaii, July 11-17, 1976. (ASCE), Chap 60, p 1006-1024. 14 fig, 3 tab, 10 ref.

Descriptors: *Tsunamis, *Coastal plains, *Surges, *Hawaii, Erosion, Flooding, *Coastal zone.

This paper concerns the run-up and inundation characteristics of tsynami surges. The forces and moments produced by the waves are not discussed, however, the proposed technique does provide the necessary information for their determination. The method relies on the knowledge of the wave elevation at the coast (as determined from historical data or other means) and an estimation of the bed roughness. The considerations and calculations involved in determining these parameters are discussed in detail. Twenty-four observed run-ups on the island of Hawaii in the case of the 1946 Aleutian tsunami, and 18 run-ups on the island of Maui for the Chilean 1960 tsunami are used to illustrate the technique. Methods are also presented to predict the shoreline heights and extent of inundation of tsunami surges where historical data is not available. (NOAA)
W78-04966

NEAR-BOTTOM WATER MOTION UNDER OCEAN WAVES,
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-04967

HURRICANE WIND AND WAVE FORECASTING TECHNIQUES,
Hawaii Univ., Honolulu. Dept. of Ocean Engineering.
C. L. Bretschneider, and E. E. Tamaye.
Sea Grant Reprint No. UNIHI-SEAGRANT-CP-77-01, Reprinted from: Proceedings 15th Coastal Engineering Conference held Honolulu, Hawaii, July 11-17, 1976. (ASCE), Chap 13, p 202-237. 15 fig, 5 tab, 24 ref.

Descriptors: *Hurricanes, *Forecasting, *Winds, *Ocean waves, *Hawaii, Shore protection, Erosion, Sedimentation, *Ocean wave spectra, Water waves, Wave forecasting, Wind forecasting, Hurricane Camille.

The various methods of wave forecasting are summarized briefly including wave spectra and its application to hurricane waves. A method is presented for determining hurricane wind fields and resulting deep water wave field. As a hurricane approaches the land, the winds are reduced by 1% per mile within 10 miles of the coast and correspondingly the waves are decreased in height, except very close to shore where the waves begin to break. However, the effect of the Islands is fairly negligible since their extent is small compared to that of the hurricane. Therefore, it is reasonable to expect significant waves of up to 30 feet and greater in height with 60 knot (69 mph) winds. In addition, instantaneous gusts of 84 knots (97 mph) may occur, and individual maximum waves could exceed 50 feet in height. Winds in the usually windy Pali (cliff) on the Island of Oahu can be expected to exceed 87 knots (100 mph). (NOAA)
W78-04968

PROJECT DEVELOPMENT AND TECHNICAL DEVELOPMENT PLAN. NEW YORK BIGHT PROJECT.
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 5G.
W78-04969

COASTAL LAGOON PLANKTON II. ANNUAL CYCLE IN YAVAROS LAGOON (1969-1970), (IN SPANISH),
Universidad Nacional Autonoma de Mexico, Mexico City. Lab. Plancton y Prod.
S. G. Aguirre, H. Santoyo, and A. Martinez.
An Inst Biol Univ Nac Auton Mex SER Zool 45(1), p 1-30, 1974. (Engl. summ.).

Descriptors: Annual cycles, *Coastal lagoons, Density, *Mexico, *Phytoplankton, Plankton, Salinity, Temperature, Tidal rhythms, *Zooplankton, *Yavaros Lagoon(Mexico), Summer.

A study of the plankton of Yavaros Lagoon, Sonora, Mexico was undertaken during 1969-1970 at 4 fixed stations. Estimates of the density of phytoplankton (cells/l) were made by the Utermohl method and zooplankton were sampled by net. The composition of phyto- and zooplankton and their relative daily and annual variations with respect to temperature and salinity were also studied. Plankton density was regulated by tidal rhythms. Summer was the time of greatest hydrological stability in the lagoon.--Copyright 1977, Biological Abstracts, Inc.
W78-04970

REPORT TO THE CONGRESS ON OCEAN POLLUTION, OVERFISHING, AND OFFSHORE DEVELOPMENT.
National Oceanic and Atmospheric Administration, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-04972

FRESHWATER AND THE FLORIDA COAST: SOUTHWEST FLORIDA,
State Univ. System of Florida Sea Grant Program, Gainesville; and Southwest Florida Water Management District, Brooksville.
W. Seaman, Jr., and R. McLean.
Sea Grant Program Report No 22, October 1977. Proceedings of a Seminar held in Tampa, Florida on May 26-27, 1977. 234 p. Also as Southwest Florida Water Management District Report No. 1977-1.

Descriptors: *Coasts, *Florida, *Estuaries, *Water management(Applied), *Groundwater, *Freshwater, Mathematical models, Ecosystems, Economics, *Conferences, Resources management.

Thirteen papers constitute the proceedings of the Seminar on Freshwater and the Florida Coast sponsored by the Southwest Florida Water Management District, held in Tampa, Florida on May 26-27, 1977. The subjects encompassed are reflected in the following topics: General description and water requirement of the District; an overview of the estuaries within the District; development and the hydrology and geohydrology of coastal drainage basins; a review and evaluation of selected numerical models for coastal zone water management; freshwater and the Florida coast; groundwater flow; the marine ecosystem from an engineering viewpoint; the role of freshwater in an estuary; the estuary--what's it to you,; the estuary viewed as a dynanmic system; some relationships between river flow, estuarine characteristics, and economics in a Florida Gulf coast region; the coastal zone: multi-use resource allocation and intitutional failure, and economics of water problems. (NOAA)
W78-04973

DEVELOPMENT AND OPERATION OF HF OCEAN CURRENT MAPPING RADAR UNITS,
National Oceanic and Atmospheric Administration, Seattle, WA. Wave Propagation Lab.
D. E. Barrick.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 1-9, March 1977. 2 fig.

Descriptors: *Ocean currents, *Mapping, *Baseline studies, Florida, Alaska, *Outer Continental Shelf, Current measurements, Gulf stream.

The first simultaneous two-site data were obtained in mid-October of 1976. Surface currents maps were generated by combining the data from the two sites, one at Fort Lauderdale and one at South Mission Beach. This map shows surface currents consistent with previously measured Gulf-Stream flows in the area off the southern coast of Florida. To this date, two-site data have been taken on October 19, 20, 26, 27, 28, 29, 30 and December 14.

At this time, there is no direct supporting surface current measurements made during radar operations. However, the results are consistent with the general magnitudes, directions, and shear of the Gulf Stream in that area, giving confidence that the radar system and data processing techniques are working properly. (Sinha-OEIS)
W78-04974

SURFACE CURRENTS OF THE NORTHEAST CHUKCHI SEA,
Bureau of Land Management, Groton, CT.
For primary bibliographic entry see Field 5B.
W78-04975

CURRENT MEASUREMENT IN POSSIBLE DISPERSAL REGIONS OF THE BEAUFORT SEA,
Washington Univ., Seattle. Dept. of Oceanography; and Washington Univ., Seattle. Applied Physics Lab.
For primary bibliographic entry see Field 5B.
W78-04976

GULF OF ALASKA STUDY OF MESOSCALE OCEANOGRAPHIC PROCESSES (GAS-MOP),
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W78-04978

NUMERICAL STUDIES OF ALASKAN REGION,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W78-04979

BRISTOL BAY OCEANOGRAPHIC PROCESSES (B-BOP),
National Oceanic and Atmospheric Administration, Boulder, CO. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W78-04980

STD MEASUREMENTS IN POSSIBLE DISPOERSAL REGIONS OF THE BEAUFORT SEA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-04981

YUKON DELTA COASTAL PROCESSES STUDY,
Houston Univ., Houston, TX. Dept. of Geology.
W. R. Dupre.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 580-553, March 1977. 10 fig, 31 ref.

Descriptors: *Deltas, *Tectonics, *Baseline studies, *Resources development, Marine geology, Alaska, Volcanoes, Oil pollution, Coasts, Pollutant transport, Outer Continental Shelf, Yukon Delta.

The Yukon-Kuskokwim delta region is characterized by widespread Quaternary tectonism. Northwest- and northeast-trending faults and structurally-controlled volcanic vents are mainly restricted to the onshore extension of the Nunivak Arch. Many of the northeast-trending faults may actually represent the slivering of the Kaltag fault, previously projected to the north of the delta. At least some of these faults appear to have had Holocene movement. The age of the volcanism is less certain, but most, if not all, of the activity appears to be pre-Holocene. The presence of extensive permafrost is evident by an abundance of geomorphic criteria as well as in field investigations. Flooding and river bank erosion along both the Yukon and Kuskokwim Rivers is strongly affected by the climatic extremes of this subpolar region. The largest floods are associated with ice breakup on the river, often accentuated by the effects of breached ice jams which form locally. Extreme floods may actually result in the complete diversion of the Yukon River, with disastrous consequences. Such events have occurred repeatedly during the Pleistocene; the most recent may have occurred only 1200 years ago. (Sinha-OEIS)
W78-04982

LAGRANGIAN SURFACE CURRENT MEASUREMENTS ON THE OUTER CONTINENTAL SHELF,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological Labs.
For primary bibliographic entry see Field 5B.
W78-04983

EXPERIMENTAL MEASUREMENTS OF SEA ICE FAILURE STRESSES NEAR GROUNDED STRUCTURES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-04987

BEAUFORT SEA, SHUKCHI SEA, AND BERING STRAIT BASELINE ICE STUDY,
Alaska Univ., College.
For primary bibliographic entry see Field 2C.
W78-04988

OPERATION OF AN ALASKAN FACILITY FOR APPLICATIONS OF REMOTE-SENSING DATA TO OCS STUDIES,
Alaska Univ., College. Geophysical Inst.
A. E. Belon.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 15. Transport, p 242-269, March 1977. 10 fig.

Descriptors: *Baseline studies, *Resources development, *Remote sensing, *Data processing, Alaska, Sea ice, Geomorphology, Sediment transport, Photography, *Outer Continental Shelf.

The principal objective of the project was to make remote-sensing data, processing facilities and interpretation techniques available to the OCS investigators so that the promising applications and cost effectiveness of remote-sensing techniques can be incorporated in their disciplinary investigations. The principal result of the project is that there now exists at the University of Alaska an operational facility for applications of remote-sensing data to OCS studies. It consists of: (1) A remote-sensing data library which routinely acquires, catalogs and disseminates information on Landsat and NOAA satellite imagery and aircraft imagery of the Alaskan continental shelf. (2) A remote-sensing data processing laboratory which provides specialized instrumentation for the photographic reproduction and optical or digital analysis of remote-sensing data of various types and formats. (3) A team of specialists that generates and develops techniques of remote-sensing data analysis and interpretation which appear to be particularly well-suited for OCS studies. (4) A staff that is continually available to OCS investigators for consultation and assistance in searching for, processing and interpreting remote-sensing data for their disciplinary investigations. (Sinha-OEIS)
W78-04990

CIRCULATION AND WATER MASSES IN THE GULF OF ALASKA,
Alaska Univ., College. Inst. of Marine Science.
T. C. Royer.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977. Vol 15. Transport, p 270-378, March 1977. 58 fig, 2 tab, 14 ref, 2 append. 03-5-022-56.

Descriptors: *Baseline studies, *Resources development, *Water masses, Circulation, Water pollution, *Outer Continental Shelf, *Gulf of Alaska, Pollutant transport, Oil and gas resources.

To define the physical-chemical environment, transports of pollutants and to establish the long-term monitoring of the physical-chemical environment in the Gulf of Alaska were the objectives of this study. The main conclusion from this year's work is that the shelf region around the Gulf of Alaska has many identifiable local circulation regimes, that is, distinctions in shelf flow can be made from one location to another. Four different regimes have been identified in the Northeast Gulf of Alaska. The implications of the findings of this research with respect to oil and gas development are that the shelf flows in the Gulf of Alaska are spatially variable but yet interconnected. This variability allows currents in excess of 2 knots to be found in the vicinity of countercurrents of low speed. Since regions of low flow are often identified with high biological productivity and long residence times, these represent especially critical regions in terms of oil and gas development. (Sinha-OEIS)
W78-04991

MARINE CLIMATOLOGY OF THE GULF OF ALASKA, THE BERING AND BEAUFORT SEAS,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center.
For primary bibliographic entry see Field 2B.
W78-04992

CLIMATIC ATLAS OF THE OUTER CONTINENTAL SHELF WATERS AND COASTAL REGIONS OF ALASKA,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center; and National Climatic Center, Ashville, NC.
For primary bibliographic entry see Field 2B.
W78-04993

NEAR-SHORE METEOROLOGY,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 2L.
W78-04994

NEAR-SHORE METEOROLOGY,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
R. M. Reynolds, and B. Walter.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977. Vol 15. Transport, p 406-490, March 1977. 19 fig, 4 tab, 18 ref, append.

Descriptors: *Baseline studies, *Resources development, *Meteorology, Winds, Meteorological data, Alaska, Model studies, Outer Continental Shelf, Surface winds, Pollutant transport, Gulf of Alaska.

Many near-surface meteorological processes act to modify the surface winds in the coastal regions of Alaska. The modification is generally extensive enough to seriously affect any attempts at relating synoptic weather maps to surface conditions.

Further from shore, the lower continental air becomes modified by both the warmer seas and upper-level entrainment of the air above, thus altering its speed and direction. The oceanic water near the surface is strongly influenced by the surface stress. As the wind makes a change in speed or direction, the water near the surface is strongly affected almost immediately. Then, with time, the momentum change diffuses downward, modifying the interior flow on a much larger time scale. The flow at depth in the oceanic mixed layer is thus related to a weighted average of past winds; in effect, its response is analogous to a low-pass filter whose cutoff frequency increases as the surface is approached. A thorough knowledge of coastal wind conditions are an important consideration in offshore industrial development through its effects both on mean flow and the trajectory of surface contaminants. This study is designed to define which processes are acting to modify coastal winds, how prevalent they are, and how far off shore they act. In addition, a study of computer simulation of coastal meteorological conditions has been undertaken to assess the applicability of a numerical model in making predictions of coastal winds. (Sinha-OEIS)
W78-04994

A STUDY OF BEAUFORT SEA COASTAL EROSION NORTHERN ALASKA,
For primary bibliographic entry see Field 2J.
W78-04995

MODELING OF TIDES AND CIRCULATIONS OF THE BERING SEA,
Rand Corp., Santa Monica, CA.
J. J. Leendertse, and S. K. Liu.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977. Vol 15. Transport, p 529-537, March 1977. 6 fig, 3 ref.

Descriptors: *Baseline studies, *Resources development, Circulation, Tides, *Model studies, Alaska, *Outer Continental Shelf, *Bering Sea, Pollutant transport.

The work pertains mainly to setting up of a model of the Eastern Bering Sea, developing the programs to effectively run the model, and making some initial adjustments to obtain an approximate agreement of water levels and flows in the model and in nature. It was determined that a model of the Bering Sea as a whole is probably too coarse to resolve the circulation in Bristol Bay and Norton Sound, where proposed oil-lease areas are located. It appears more desirable to model these areas separately. The model to be used in this study is a three-dimensional finite difference model. It computes water levels, currents, salinity distributions and temperature distributions from boundary data inputs and initial conditions on a three-dimensional grid system. (Sinha-OEIS)
W78-04996

NORTON SOUND/CHUKCHI SEA OCEANOGRAPHIC PROCESSES (N-COP),
Washington Univ., Seattle. Dept. of Oceanography; and National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
L. K. Coachman, R. L. Charnell, J. D. Schumacher, K. Aagaard, and R. D. Muench.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977. Vol 15. Transport, p 579-660, March 1977. 45 fig, 3 tab, 10 ref.

Descriptors: *Baseline studies, *Resources development, *Circulation, *Advection, *Diffusion, Oceanography, Water pollution, Alaska, Oil pollution, *Outer Continental Shelf, Norton Sound, Chukchi Sea, Pollutant transport, Petroleum development.

The circulation in Norton Sound was analyzed from the cruise data of 26 September to 6 October. The general flow in the western two-thirds of the Sound was cyclonic, and the bathymetry appears to be important in guiding the flow. There was inflow from the west near bottom in the two deeper troughs, and strong vertical mixing particularly in the northern trough off Nome where there was concentrated an intense westerly outflow. A two-layered density system reflected presence of upper and lower turbulent boundary layers. The pycnocline suppressed vertical heat flux, and in the eastern basin isolated the coldest bottom water. Water exchange with the western basin was very slow and appeared to be lateral diffusion rather than advection. Four anchored 24-hour stations including direct current measurements showed (1) the strong relationship between flow and the local winds and (2) internal waves on the pycnocline of 2-3 m amplitude and of tidal and higher frequencies. Preliminary analysis of Kotzebue Sound showed similarities to Norton Sound. (Sinha-OEIS)
W78-04998

SEA-SURFACE TEMPERATURE AND SALINITY MAPPING FROM REMOTE MICROWAVE RADIOMETRIC MEASUREMENTS OF BRIGHTNESS TEMPERATURE,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
H.-J. Blume, B. M. Kendall, and J. C. Fedors.
Available from the National Technical Information Service, Springfield, VA 22161 as NASA TP-1077, Price codes: A03 in paper copy, A01 in microfiche. Report No. NASA TP-1077, December 1977. 26 p, 9 fig, 4 tab, 16 ref.

Descriptors: *Salinity, *Microwaves, *Radiometer, Surface waters, *Remote sensing, Estuarine environment, Chesapeake Bay, Atlantic Ocean, Oceanography, Water temperature, *Sea-surface temperature, *Brightness temperature, *Radiometer.

A remote dual-frequency microwave radiometer was utilized in flight measurements from an aircraft at an altitude of 1.4 km over the lower Chesapeake Bay and coastal areas of the Atlantic Ocean. The radiometers, operating at 1.43 GHz (optimal frequency for salinity measurements) and 2.65 GHz (optimal for temperature measurements), comprise a third-generation system using null balancing and feedback noise injection. The use of a dual-frequency microwave radiometer was advantageous since it could operated at night and probe through clouds. Accuracies in temperature of 1 degree and in salinity of 1 part per thousand for salinity greater than 5 parts per thousand were attained after correcting for the influence of extraterrestrial background radiation, atmospheric radiation and attenuation, sea-surface roughness, and antenna beamwidth. (Seip-IPA)
W78-05017

DECREASE IN HARBOR MAINTENANCE DREDGING THROUGH THE USE OF PILE DIKES AND RELATED STRUCTURES TOGETHER WITH AN ANALYSIS OF ESTUARINE SEDIMENTATION PROBLEMS,
Naval Academy Annapolis, MD. Dept. of Oceanography.
For primary bibliographic entry see Field 8B.
W78-05050

TRACE METALS IN ORGANISMS FROM OCEAN DISPOSAL SITES OF THE MIDDLE EASTERN UNITED STATES,
National Marine Fisheries Service, Milford, CT. Milford Lab.
For primary bibliographic entry see Field 5A.
W78-05059

INTERACTIONS BETWEEN ZINC AND SUSPENDED SEDIMENTS IN THE FRASER RIVER ESTUARY, BRITISH COLUMBIA,
British Columbia Univ., Vancouver. Dept. of Geological Sciences.
For primary bibliographic entry see Field 5A.
W78-05061

THE INVASION OF SAURIDA UNDOSQUAMIS (RICHARDSON) INTO THE LEVANT BASIN: AN EXAMPLE OF BIOLOGICAL EFFECT OF INTEROCEANIC CANALS,
Fisheries Technology Unit, Haifa (Israel).
For primary bibliographic entry see Field 5C.
W78-05062

HEAVY METALS FROM WASTE DISPOSAL IN CENTRAL PUGET SOUND,
Washington Univ., Seattle. Lab. of Radiation Ecology.
For primary bibliographic entry see Field 5B.
W78-05073

EFFECTS OF SALINITY AND ILLUMINATION ON PHOTOSYNTHESIS AND WATER BALANCE OF SPARTINA ALTERNIFLORA LOISEL,
Duke Univ., Durham NC. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W78-05077

AN ECOLOGICAL SURVEY OF THE HEAVY METAL CONTAMINATION OF THE EDIBLE CLAM PAPHIA SP. ON THE IRON-ORE TAILINGS OF TOLO HARBOUR, HONG KONG,
Chinese Univ. of Hong Kong. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-05078

POLYCHLORINATED BIPHENYLS IN COTTIDS, MUSSELS, AND SEDIMENT IN SOUTHERN PUGET SOUND, WASHINGTON,
Evergreen State Coll., Olympia, WA.
For primary bibliographic entry see Field 5C.
W78-05084

ECOLOGICAL COMPARISONS BETWEEN A FRESH-WATER TIDAL MARSH AND ADJOINING IMPOUNDMENT IN SOUTHEASTERN PENNSYLVANIA,
Pennsylvania State Univ., University Park. School of Forestry.
C. W. Schwartz.
M.S. Thesis, November, 1976. 77 p, 6 fig, 20 tab, 28 ref.

Descriptors: *Tidal marshes, *Wildlife management, *Waterfowl, *Productivity, *Recreation, *Habitat improvement, *Marsh management, Wetlands, Marshes, *Pennsylvania, Impoundments, Fish management, Black duck, Mallard duck, Canada goose, Shore birds, Water birds, Game birds, Water quality, Nitrogen, Nesting, Nesting cover, Recreation demands, Aesthetics, *Tinicum Marsh, Tinicum National Environmental Center.

Tinicum Marsh is Pennsylvania's largest tidal marsh and is located in a heavily urbanized area. A study was initiated to evaluate the marsh prior to management and provide a base line for monitoring future changes. Six water quality parameters (temperature, oxygen, pH, orthophosphate, nitrates, nitrites) were measured. Orthophosphate and nitrite were greater in the tidal marsh than in the impoundment due to large amounts of sewage released into the area. All other parameters were similar. Neither area is capable of supporting a healthy, diverse fishery. Recorded waterfowl production was not extensive in either area and has been decreasing since 1958. Small numbers of

Canada geese, mallards, and black ducks continue to reproduce there. The major waterfowl use occurs in the impoundment during the winter, nearly all wintering birds were dabbling ducks. Summer waterfowl use was equally divided between the impoundment and tidal marsh. Use by water birds was greater in the impoundment while shorebird use was higher in the marsh due to the greater abundance of mud flats. Most use occurred in the early morning and late evening when human use was light. (Steiner-Mass)
W78-05090

ECOLOGY OF A NEW ENGLAND SALT MARSH,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5C.
W78-05093

MEASUREMENTS BY GEOMAGNETIC INDUCTION OF VOLUME TRANSPORT IN A SALT MARSH DRAINAGE CHANNEL,
Woods Hole Oceanographic Institution, MA.
T. B. Sanford.
Limnology and Oceanography, Vol 22, No 5, p 1082-1089, December, 1977. 5 fig, 15 ref.

Descriptors: *Salt marshes, *Drainage, *Flow measurement, *Magnetic studies, Wetlands, Tidal marshes, Drainage water, Nutrients, Cycling nutrients, Volumetric analysis, Sea water, Channels, Zeta potential, Water measurement, Current meters, *Geomagnetic induction.

Volume transport of seawater through a salt marsh drainage channel is obtained by geomagnetic induction. The electric potential difference across the channel is interpreted in terms of water motion through the vertical component of the earth's magnetic field. A model is formulated relating volume transport to induced potential differences and a salt bridge technique described for measuring weak voltages. Calibration requires independent measurements of the volume transport. Using surface flow, rather than volume transport, for calibration results in method errors as large as 25%. Calibration against directly measured volume transport would reduce these errors. (Steiner-Mass)
W78-05094

AN OUTDOOR MODEL SIMULATING A BALTIC SEA LITTORAL ECOSYSTEM,
Swedish Water and Air Pollution Research Lab. Stockholm.
For primary bibliographic entry see Field 5C.
W78-05096

WETLAND INVENTORY, ONEIDA COUNTY, NEW YORK,
Oneida County Environmental Management Council, Utica, NY.
For primary bibliographic entry see Field 6G.
W78-05099

THE VEGETATION OF BRITISH INLAND SALT MARSHES,
Manchester Univ. (England) Dept. of Botany.
For primary bibliographic entry see Field 2I.
W78-05100

BARATARIA BASIN EUTROPHICATION CASE HISTORY,
Louisiana State Univ., Baton Rouge. Center for Wetlands Resources.
For primary bibliographic entry see Field 5C.
W78-05108

GROUNDWATER AND NEARSHORE HYPOSALINE CONDITIONS AT FANNING ISLAND DURING A PERIOD OF HIGHER THAN NORMAL RAINFALL,
Hawaii Univ., Honolulu. Dept. of Zoology.
For primary bibliographic entry see Field 2F.
W78-05110

PRELIMINARY REPORT TO INTERNATIONAL DECADE OF OCEAN EXPLORATION (IDOE) ON THE POSSIBLE EFFECTS OF THE CERATIUM TRIPOS BLOOM IN THE NEW YORK BIGHT, MARCH-JULY 1976,
Brookhaven National Lab., Upton, NY. Dept. of Applied Science.
For primary bibliographic entry see Field 5C.
W78-05126

APONIN, A CYTOLYTIC FACTOR TOWARD THE RED TIDE ORGANISM, GYMNODINIUM BREVE. BIOLOGICAL ASSAY AND PRELIMINARY CHARACTERIZATION,
University of South Florida, Tampa. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W78-05128

THE ISLAND MASS EFFECT ON THE PHYTOPLANKTON AND PRIMARY PRODUCTION OF THE HAWAIIAN ISLANDS,
Australian Inst. of Marine Sciences, Townsville.
For primary bibliographic entry see Field 5C.
W78-05158

FACTORS AFFECTING THE SEASONAL ABUNDANCE, COMPOSITION AND DIVERSITY OF FISHES IN A SOUTHEASTERN NEW ENGLAND ESTUARY,
Southeastern Massachusetts Univ., North Dartmouth.
J. G. Hoff, and R. M. Ibara.
Estuarine and Coastal Marine Science, Vol 5, p 665-678, 1977. 9 fig, 1 tab, 22 ref.

Descriptors: *Seasonal, *Annual succession, *Salinity, *Biological communities, *Fish population, *Water temperature, *Estuaries, Sampling, Temperature, Massa drusetts, Annual populations, Marine fish, *Estuarine fisheries, Slocum River, Buzzards Bay, Mid-Atlantic states.

Fish communities in the Slocum River, Buzzards Bay, Massachusetts were sampled over a 2-year period. Physical variables were measured when each of the 221 seine hauls were taken. The measures of species diversity were computed for each month and the physical and biological data were subjected to factor analysis. Temperature was overall the most important physical factor while salinity was most important within seasons. The other physical variables measured were generally intercorrelated with temperature of with salinity and had by themselves no discernible effect on the abundance, composition, or diversity of the fishes. (Katz)
W78-05179

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

WATER: THE WELLS NEED NEVER RUN DRY,
For primary bibliographic entry see Field 4B.
W78-04929

3B. Water Yield Improvement

EVALUATION OF WATER APPLICATION AND TRAFFICABILITY OF CENTER-PIVOT IRRIGATION SYSTEMS,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W78-04706

3C. Use Of Water Of Impaired Quality

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE WATER: PART I. SOIL-WATER QUALITY AND VEGETATIVE RESPONSES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-04704

EFFECT OF FUNGICIDE RATE, SPRAY INTERVAL; TIMING OF SPRAY APPLICATION, AND PRECIPITATION IN RELATION TO CONTROL OF PHYTOPHTHORA LEAF BLIGHT OF TARO,
Hawaii Univ., Honolulu. Dept. of Plant Pathology.
R. R. Bergquist.
Ann Bot (Lond). 38(154), p 213-221, 1974.

Descriptors: *Carbamates, *Colocasia-esculenta, *Fungicides, *Hawaii, *Leaf bight, M-45, *Phytophthora leaf bight, Phytophthora-colocasiae, *Rainfall, Spray application, Temperature.

Three fungicide rates 4.48, 2.24, and 1.12 kg/ha, and 4 spray intervals, 5-,7-,10- and 14-day intervals, were investigated for the control of Phytophthora (colocasiae) leaf blight of taro (Colocasia esculenta) in a subtropical field environment in Hawaii. The fungicide rate was studied in 2 separate locations on the windward sides of the island of Kauai. The fungicide utilized in these experiments was a co-ordination product of Zn ion and Mn ethylene bisdithiocarbanmate (Dithane M-45, 80% WP). In the lower rainfall location, there was no difference due to different fungicide rates while in the wetter location, the 4.48 kg/ha rate gave better control than the 1.12 kg/ha rate. There was no difference between the 5-, 7-, and 10-day spray intervals but when compared with the 14-day interval, the 5-day interval was superior. Periods of increased rainfall were reflected in the following wk by increased lesion counts. Present data indicate that rainfall is a major factor to consider as a basis for predicting disease occurrences and may be utilized for planning interval of fungicide application. The amount of disease was a function of initial disease levels, rainfall, temperature, relative humidity, fungicide rate and spray interval between fungicide applications. Applications of fungicide at weekly intervals when weekly rainfall accumulation exceeded 1 cm/wk and/or when lesion counts exceeded more than 1/plant gave substantial disease control. Thus, once these parameters of disease have been established, fungicide application could be governed conveniently by monitoring rainfall and disease incidence to achieve practical Phytophthora leaf blight control. The 2.24 and 4.48 kg ha -1 rates gave significant yield increases over the 1.12 and check (no fungicide) treatments where Phytophthora leaf blight occurred in epidemic proportions.--Copyright 1974, Biological Abstracts, Inc.
W78-04764

AN ECONOMIC ANALYSIS OF OPTIMAL INVESTMENT SCHEDULING FOR SALINITY CONTROL IN THE COLORADO RIVER,
California Univ., Berkeley. Dept. of Civil Engineering: California Univ., Berkeley. Graduate School of Management.
For primary bibliographic entry see Field 5G.
W78-04817

ARID ZONE IRRIGATION, ECOLOGICAL STUDIES: ANALYSIS AND SYNTHESIS, VOL. 5,
For primary bibliographic entry see Field 3F.
W78-04926

GENOTYPIC RESPONSES TO SALINITY,
California Univ., Davis. Dept. of Land, Air and Water Resources.
D. W. Rush, and E. Epstein.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 720, Price codes: A02 in paper copy, A01 in microfiche. Plant Physiology, Vol 57, p 162-166, 1976. 2 fig, 5 tab, 13 ref.

Descriptors: *Salt tolerance, *Tomatoes, *Ecotypes, *Plant growth, Salinity, Growth rates, Saline water, Plant physiology, Biochemistry, Sea water, Potassium, Amino acids, Sodium, Galapagos Islands, Lycopersicon cheesmanii, Lycopersicon esculentum, Sugars, Electrical conductivity.

A study was made of the differences between salt-sensitive and salt-tolerant genotypes of the tomato. Four ecotypes of the species Lycopersicon cheesmanii, ssp. minor (Hook) C.H. Mull. from the Galapagos Islands were compared with L. esculentum Mill cv. VF 36 with respect to salt tolerance. The L. cheesmanii ecotype that proved most salt tolerant was selected for detailed comparison with the L. esculentum cultivar. Growth rates under saline conditions were examined and amino acid, sugar, total amino nitrogen, free acidity, and Na and K levels in the tissues of the most and least tolerant plants were measured under salt stress and non-stress conditions. Results indicate that all Galapagos ecotypes were far more salt-tolerant than was the esculentum cultivar. They could survive in full strength seawater nutrient solution while the esculentum cultivar could not in most cases survive levels higher than 50%. (Castricone-Arizona)
W78-04928

WATER QUALITY AND SOIL PROPERTIES: WATER QUALITY AND ITS EFFECT ON THE PROPERTIES OF LIGHT TEXTURED SOILS,
Rajasthan Coll. of Agriculture, Jaipur (India). Dept. of Soil Science and Agricultural Chemistry.
For primary bibliographic entry see Field 2G.
W78-04930

LIMNOLOGIC STUDIES ON THE COLORADO RIVER FROM LEE'S FERRY TO DIAMOND CREEK,
Arizona State Univ., Tempe. Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W78-05003

WATER SUPPLY DILEMMAS OF GEOTHERMAL DEVELOPMENT IN THE IMPERIAL VALLEY OF CALIFORNIA,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 4B.
W78-05028

SOIL SALINITY- FOUR-ELECTRODE CONDUCTIVITY RELATIONSHIPS FOR SOILS OF THE NORTHERN GREAT PLAINS,
Agricultural Research Service, Sidney, MT.
For primary bibliographic entry see Field 2G.
W78-05046

QUANTITY AND QUALITY CONSIDERATIONS FOR WATER USE EFFICIENCY IN IRRIGATION,
Texas Tech Univ., Lubbock. Dept. of Plant and Soil Science; and Texas Tech Univ., Lubbock. Dept. of Biological Sciences.
For primary bibliographic entry see Field 3F.
W78-05054

3D. Conservation In Domestic and Municipal Use

ACHIEVING URBAN WATER CONSERVATION--A HANDBOOK,
Colorado Univ., Boulder. Dept. of Civil, Environmental and Architectural Engineering.
J. E. Flack, W. P. Weakley, and D. W. Hill.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 174, Price codes: A10 in paper copy, A01 in microfiche. Colorado Water Resources Research Institute, Environmental Resources Center, Ft. Collins, Completion Report No. 80 (Part I), September 1977. 207 p, 11 fig, 43 tab, 113 ref, 5 append. OWRT A-030-COLO(Part I) (3).

Descriptors: Cities, *Planning, *Water supply, Costs, Economics, Prices, Conservation, Demand, *Utilities, *Water conservation, Direct reuse, Water consumption, Water requirements, *Cost comparisons, Elasticity of demand, Water rates, Water reuse, *Water demand, *Colorado, *Feasibility studies, *City planning, Denver(Colo), Lyons(Colo), *Water utilization.

This study concerned the feasibility of using various water conservation measures to reduce urban water demand. Focusing on residential water use, ten conservation techniques were found to be relevant. Structural means such as meters, recycle systems, water saving devices and flow and pressure reducers were evaluated. System and household leakage and water use restrictions were among the operations means investigated. Codes, public education, pricing, and horticultural changes were social and economic means studied. Water demand reductions of up to 35 to 40% were possible using combinations of these water conservation methods. A procedure for determining a technically feasible program of conservation acceptable to water users was developed. Application of these procedures by a water utility will permit design of an acceptable water conservation program whose implementation will result in predictable water savings. (See also W78-04703)
W78-04702

ACHIEVING URBAN WATER CONSERVATION: TESTING COMMUNITY ACCEPTANCE,
Colorado State Univ., Fort Collins. Dept. of Political Science.
R. W. Snodgrass, and D. W. Hill.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 189, Price codes: A10 in paper copy, A01 in microfiche. Colorado Water Resources Research Institute, Environmental Resources Center, Ft. Collins, Completion Report No. 81 (Part II), September 1977. 205 p, 15 fig, 21 tab, 83 ref. A-030-COLO(3) (Part II).

Descriptors: Cities, Planning, *Water supply, Costs, Economics, Prices, Conservation, Demand, *Utilities, Direct reuse, Surveys, Water consumption, Water requirements, *Cost comparisons, Elasticity of demand, Water rates, *Colorado, *Attitudes, *Water conservation, *Water demand, Water reuse, Water utilization, *City planning, Denver(Colo), Lyons(Colo), Social participation, Community development, Public participation.

Employing a Q-Sort Factor Analytical Design, this study sought to develop a system for parametric representation of non-linear data structures using data acquired from representative samples of entire communities. The representations are specified in terms of a spatial metric 'social space,' an analog of psychological space. The defined social space is then characterized and used to define the community action zone which is hypothesized to a zone of community acceptance for those policies falling within its bounds. Such a zone for the communities of Lafayette and Louisville, Colorado was used to define socially and politically feasible water conservation policies for the communities. Policies with the highest feasibility for acceptance were legal restrictions on water use and restrictions on growth and development. The next most feasible were horticultural techniques and economic solutions. Reuse for agricultural purposes also appeared to have some political feasibility. This study demonstrated the usefullness of survey research in delineating viable water conservation programs. (See also W78-04702)
W78-04703

RAPID CITY COMBATS THE EFFECTS OF URBAN RUNOFF ON SURFACE WATER,
Environmental Protection Agency, Pierre, SD.
For primary bibliographic entry see Field 5B.
W78-05044

3E. Conservation In Industry

DECISION STRUCTURE FOR ASSESSMENT OF THE ECONOMIC IMPACT OF WATER QUALITY STRATEGIES IN AN INDUSTRIAL WATERSHED,
Wisconsin Univ.-Madison Dept. of Real Estate and Urban Land Economics.
For primary bibliographic entry see Field 5G.
W78-04701

GROUND-WATER RESOURCES OF COLQUITT COUNTY, GEORGIA,
Geological Survey, Doraville, GA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04875

GRANULATION OF COMPLEX FERTILIZERS CONTAINING AMMONIUM SULFATE BY MELT TECHNOLOGY,
Ferguson Industries, Dallas, TX.
For primary bibliographic entry see Field 5G.
W78-05118

3F. Conservation In Agriculture

EVALUATION OF WATER APPLICATION AND TRAFFICABILITY OF CENTER-PIVOT IRRIGATION SYSTEMS,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
A. D. Barefoot.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 173, Price codes: A03 in paper copy, A01 in microfiche. Oklahoma Water Resources Research Institute, Stillwater, Completion Report, January 1978. 42 p, 7 fig, 8 tab, 16 ref. OWRT A-062 OKLA(1), 14-34-0001-6037.

Descriptors: *Spray nozzle, *Center-pivot irrigation, Pressure, *Evaporation, Low trajectory, *Irrigation practices, *Irrigation efficiency, Application rates, *Sprinkler irrigation, Reduced pressure.

Spray distribution obtained from a single stationary sprinkler head was utilized to determine the effects of reduced operating pressure on evaporation loss, uniformity of application, sprinkler spacing, and application rate of a center-pivot sprinkler

irrigation system. Patterns obtained from a spray nozzle, part circle sprinkler, 26 degree trajectory full circle sprinkler, and 6 degree trajectory full circle sprinkler were simulated to moving patterns. The 6 degree trajectory full circle sprinkler had uniformities comparable to the 26 degree trajectory full circle sprinkler with about 24 percent less evaporation loss and about seven percent less wetted diameter on the average of the four pressures. A recommendation for sprinkler spacing was made which would provide satisfactory sprinkler performances at reduced pressure. Application rates were much higher for the spray nozzle than the sprinklers.
W78-04706

EVENT-BASED FORMULATION OF WATERSHED MANAGEMENT,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 4D.
W78-04712

CONSERVATION FARM PLANNING,
Soil Conservation Service, Fort Wayne, IN.
For primary bibliographic entry see Field 4D.
W78-04723

TILLAGE AND SIMULATED RAINFALL STUDIES,
Purdue Univ., Lafayette, IN. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-04725

SOIL HYDRAULIC PROPERTIES DETERMINED BY INFILTRATION EXPERIMENTS AND SIMULATION,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 2G.
W78-04812

EXPERIMENTAL EVALUATION OF THEORETICAL SOLUTIONS FOR SUBSURFACE DRAINAGE AND IRRIGATION,
North Carolina State Univ. at Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2G.
W78-04828

THE POTENTIAL WIND EROSION PROBLEM IN THE UNITED STATES,
Soil Conservation Service, Washington, DC. Ecological Sciences and Technology Div.
For primary bibliographic entry see Field 4D.
W78-04838

MINIMUM TILLAGE FALLOW SYSTEMS FOR REDUCING WIND EROSION,
Nebraska Univ. Panhandle Station at Scottsbluff.
For primary bibliographic entry see Field 4D.
W78-04840

REDUCING WIND EROSION WITH BARRIERS,
Agricultural Research Service, Manhattan, KS. North Central Region.
For primary bibliographic entry see Field 4D.
W78-04841

MODELING SOIL WATER MOVEMENT INTO PLANT ROOTS,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2D.
W78-04843

IRRIGATION IN THE ALLUVIAL PLAIN OF NORTHWESTERN MISSISSIPPI, 1975,
Geological Survey, Jackson, MS. Water Resources Div.
J. A. Callahan.
Mississippi Board of Water Commissioners, (Jackson), Bulletin 77-1, 1977. 61 p, 7 fig, 20 tab, 8 ref.

Descriptors: *Irrigation, *Rice, *Agriculture, *Mississippi, *Deltas, Water yield, Groundwater, Surface waters, Water quality, Water utilization, Irrigation wells, Well data, Aquifers, *Row crops.

The alluvial plain in the northwestern part of Mississippi, commonly referred to as the 'Delta,' produces essentially all the rice and a large percentage of the row crops grown in the State. More than 95 percent of the State's irrigation is in the Delta rice is one of the main crops, and in 1975, 175,000 acres were planted. The water requirement for rice (about 6 feet) is by far the largest of any crop. It is estimated that about 1,945 mgd of water from all sources was used for rice farming in 1975. About 82 percent of the water was produced by wells, and surface water accounted for 18 percent. Irrigation of row crops was estimated at 94 mgd, of which 60 percent was ground water and 40 percent was surface water. The ground-water withdrawal rate in 1975 was 1,595 mdg for rice, 56 mgd for row crops, and 182 mgd for other purposes-- about 35 percent of the 5,200 mgd for row crops, and 182 mgd for other purposes-- about 35 percent of the 5,200 mgd which has been estimated to be available during the 122-day growing season from the Mississippi River Valley alluvial aquifer in the Yazio basin. The dissolved solids in the ground water are generally less than 500 mg/liter, but in places exceed 700 mg/liter. The water has a low sodium hazard and low to medium salinity hazard. (Woodard-USGS)
W78-04861

ESTIMATION OF DRY SEASON RUNOFF FROM RAINFALL FOR SELECTED DIVERSION IRRIGATION SYSTEM,
Govind Ballah Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Agricultural Engineering.
M. R. De Vera.
Philipp Agric. 56(9/10), p 340-352, 1973.

Descriptors: Diversion, *Dry season runoff, *Irrigation systems, *Rainfall, *Regression analysis, Runoff, Seasonal, Model studies, Phillipines, Estimating.

Two multiple regression models are used to relate antecedent rainfall to dry season flow of 14 rivers serving diversion irrigation systems in the Philippines. The 1st model expresses runoff as a function of the bimonthly rainfall totals in centimeters from the preceding 8 mo. and the 2nd model relies on the 2 bimonthly totals most highly correlated to flow and the number of rainy days with 25 mm or more rainfall from the preceding 6 mo. period. The models have little difference in their predictive accuracy. Although the standard error of estimate is relatively high, equations for half of the rivers studied could explain more than 60% of the variation in runoff, and for some rivers over 80% in the 2nd model. Copyright 1974, Biological Abstracts, Inc.
W78-04925

ARID ZONE IRRIGATION, ECOLOGICAL STUDIES: ANALYSIS AND SYNTHESIS, VOL. 5,
43p. Springer-Verlag: New York, N. Y., Heidelberg, W. Ger. 1973. Yaron, B., Danfors, E., Vaadia, Y. (Ed.).

Descriptors: Crops, *Ecological studies, Forage crops, Fruit crops, *Irrigation, Vegetable crops, *Arid lands, *Arid-zone soils, *Climates(Arid lands), Soils, *Soil-water-plant relationships.

Climate and arid-zone soils, Arid-zone hydrology and management of water resources are discussed. Water transport processes in the soil-plant-atmosphere continuum are described. Theoretical and practical aspects of the chemistry of irrigated soils are covered, such as nutrient supply to irrigated crops, solute movement in soils, and ion-exchange in irrigated soils. Soil survey, measurement of water status in soils, important soil characteristics relevant to irrigation, and evapotranspiration estimation are discussed in relation to irrigation design and control. Salinity problems in irrigation of arid and semi-arid zones are studied. The sprinkler, gravity and trickle irrigation systems are described. Crop water requirement, e.g. irrigation of field, fruit, vegetable and forage crops and the efficient use of water in irrigation are examined.--Copyright 1974, Biological Abstracts, Inc.
W78-04926

SOIL MOISTURE SENSING WITH AIRCRAFT OBSERVATIONS OF THE DIURNAL RANGE OF SURFACE TEMPERATURE,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
For primary bibliographic entry see Field 2G.
W78-05027

SEDIMENT FROM DRAINAGE SYSTEMS FOR CLAY SOILS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-05030

WIND EROSION: PROCESSES AND EFFECT ON SOIL PRODUCTIVITY,
Agricultural Research Service, Manhattan, KS. North Central Region.
For primary bibliographic entry see Field 2J.
W78-05031

ESTIMATING RUNOFF FROM FURROW IRRIGATION,
Kansas State Univ., Garden City. Garden City Experiment Station.
F. E. Ohmes, and H. L. Manges.
Transactions of the American Society of Agricultural Engineers, Vol 20, No 6, p 1089-1092, November-December 1977. 3 fig, 2 tab, 6 ref. EPA 13040DAT.

Descriptors: *Runoff, *Furrow irrigation, *Kansas, *Hydrographs, On-site tests, Theoretical analysis, Analytical techniques, Inflow, Model studies, Mathematical models, Hydrograph analysis, Infiltration rates, Return flow.

Inflow into and outflow from furrows during irrigation were measured. Both theory and field measurements showed that runoff rates from a graded furrow can be expressed as a function of time for the rising portion of the runoff hydrograph and then becomes constant. At a minimum, only two runoff rate readings during the rising portion of the runoff hydrograph and one during the period of constant runoff rate, plus the initial runoff time, are required to evaluate the constants in the equations. The volume of runoff during furrow irrigation can be determined by integrating the two runoff rate equations with time elapsed after runoff began. (Humphreys-ISWS)
W78-05034

INCREASING WATER UTILIZATION EFFICIENCY OF A PASTURE GRASS BY INCREASING AFTERMATH THROUGH PLANT SELECTION,
South Dakota State Univ., Brookings. Dept. of Plant Science.
J. G. Ross.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 686, Price codes: A03 in paper copy, A01 in microfiche. Completion Report for Phase I and Phase II, September 1977. 45 p, 22 tab, 13 ref. OWRT A-039-SDAK(1) and A-056-SDAK(1), 14-31-0001-4042, 14-34-0001-7078.

Descriptors: *Water utilization, Land use, Plant breeding, *Forage grasses, *Bromegrass, Vegetative regrowth, *Efficiencies, *Consumptive use, Crop production, *Plant growth, Aftermath, South Dakota, Smooth bromegrass.

Maximum land utilization requires that maximum production be obtained throughout the growing season. Perennial crops such as forage grasses have the potential for production during an entire grazing season. However, most grasses have requirements for growth that limit them to early or late or part of mid-season growth. Cool season grasses now grown in the upper Great Plains area produce little forage during warm summer months even though favorable moisture and fertility conditions prevail. The reason is that these grasses have been selected naturally for summer dormancy since moisture is normally lacking under dryland conditions. This project sought a grass which would give the greatest amount of aftermath under favorable moisture conditions. Selection has been achieved of a variety of smooth bromegrass, SD 5, which is superior in regrowth and, therefore, in water utilization efficiency, to the variety Lincoln, now recommended in South Dakota. Stand persistence of this variety under an intensive cutting regime with alfalfa would also be expected to be superior as indicated in a persistence study. This variety can be expected to increase summer yields under irrigation and under dry-land when sufficient moisture is present. Seed yield of this variety appears to be sufficient to ensure its success. (Wiersma-So Dak St)
W78-05052

QUANTITY AND QUALITY CONSIDERATIONS FOR WATER USE EFFICIENCY IN IRRIGATION,
Texas Tech Univ., Lubbock. Dept. of Plant and Soil Science; and Texas Tech Univ., Lubbock. Dept. of Biological Sciences.
D. R. Krieg, J. R. Goodin, and R. G. Stevens.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 665, Price codes: A04 in paper copy, A01 in microfiche. Final Report, August 1, 1977. 61 p, 1 fig, 19 tab, 29 ref. C-6273(No. 5225)(3).

Descriptors: *Irrigation efficiency, *Water utilization, *Irrigation scheduling, *Water use efficiency, Plant development, *Leaf water potential, Water quality, Brackish water, Salinity, Stomata, Transpiration, Water stress, Salt stress, *Plant growth, Impaired water use, *Crop production, Saline soils, Sorghum, Corn(Field), Cotton, Potatoes, Alfalfa, Atriplex, *Forage crops.

Leaf water potential can be used as a tool in irrigation scheduling to maintain high production potential and increase water use efficiency in agronomic and horticultural crops, provided crop type and stage of development are considered. Water conservation through stomatal closure was not evident in sorghum, corn, and cotton. Leaf water potential does not appear to be a useful criterion for irrigation scheduling in potato, since stomatal closure occurs under slight stress. For forage crops such as alfalfa or Atriplex, yields were reduced in proportion to increasing plant stress. Atriplex could tolerate much drier soil conditions than could alfalfa. Brackish water may represent a feasible alternative for irrigation of agronomic crops if properly managed. The duration of this project was not sufficient to determine the real significance of the use of salt water, although in the first year yield increases were observed in salt treatments compared with fresh water treatments. In the second year, yield reductions were observed, primarily due to poor seedling establishment. The perennial forage crops tolerated high soil salinities very well. Crop quality was not changed significantly by water or salt stress.
W78-05054

AIR TEMPERATURE AND VAPOR PRESSURE CHANGES CAUSED BY SPRINKLER IRRIGATION,
Agricultural Research Service, Kimberly, ID. Snake River Conservation Research Center.
For primary bibliographic entry see Field 2D.
W78-05086

SOIL-PLANT-WATER ASPECTS OF OZONE PHYTOTOXICITY IN TOMATO PLANTS,
Guelph Univ. (Ontario). Dept. of Horticultural Science.
For primary bibliographic entry see Field 5C.
W78-05154

POSSIBLE ENERGY SAVINGS IN IRRIGATION,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4B.
W78-05191

SUN SHINES ON A NEW IRRIGATION PROJECT.
Ground Water Age, Vol 12, No 6, p 28-29, February, 1978.

Descriptors: *Irrigation systems, *Pumping, *Solar radiation, Irrigation engineering, Costs, Nebraska.

A solar array recently constructed near Mead, Nebraska became the largest such system in the world, and will be used to power a redesigned automatic gated pipe irrigation unit that will water 80 acres of corn and soybeans. This photovoltaic system differs from the solar thermal systems utilizing organic Rankine cycle turbines which are being tested elsewhere. The array consists of two 325-foot-long rows, incorporating 120,000 individual solar cells and capable of generating 25,000 watts at the unit's peak. Large lead acid batteries will be used to store 85 kilowatts of power for off-peak operation. It is expected that the system will at times, generate more power than can be used. Plans are to hook up another load at such times or go to a power dump (large resistor bank) to dissipate surplus energy. Future plans call for testing thin solar collector ribbons which can be mounted at greater density than silicon wafers, thus helping bring costs down. Prospects for solar grain drying are also being reviewed. This project is joint effort of the University of Nebraska and Massachusetts Institute of Technology's Lincoln Laboratory. (Eberle-NWWA)
W78-05198

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

EFFECTS OF PHYTOPLANKTON ON DISSOLVED OXYGEN CONCENTRATION IN CATFISH PONDS,
Auburn Univ., AL. Water Resources Research Inst.
For primary bibliographic entry see Field 5C.
W78-04710

EFFECTS OF DESTRATIFICATION ON DEPTH DISTRIBUTION OF FISH,
Oklahoma Cooperative Fishery Research Unit., Stillwater.
For primary bibliographic entry see Field 5C.
W78-04713

THE U.S. GEOLOGICAL SURVEY AND LAND USE MAPPING,
Geological Survey, Reston, VA.
For primary bibliographic entry see Field 7B.
W78-04718

TEST PLAN FOR THE LARGE-SCALE OPERATIONS MANAGEMENT TEST OF THE USE OF THE WHITE AMUR TO CONTROL AQUATIC PLANTS,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Mobility and Environmental Systems Lab.
E. E. Addor, and R. F. Theriot.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A036 197, Price codes: A04 in paper copy, A01 in microfiche. Instruction Report A-77-1, Final report, January 1977. 67 p, 41 fig, 4 tab. A-77-1.

Descriptors: *Lake Conway(FL), *White amur, *Aquatic weed control, *Biocontrol, *Hydrilla verticillata, Florida, Ctenopharyngodon idella, Fish, Carp, Monosex fish, Ecosystem, Environmental effects.

Plans have been completed for an operational-scale test using the white amur fish (Ctenipharyngodon idella) to control the aquatic Hydrilla verticilatta. This fish, known also as the Asian grass carp, is a voracious feeder--apparently exclusively vegetarian--which shows a decided preference for hydrilla. The site chosen for the experiment is a chain of three small natural lakes collectively referred to as Lake Conway, south of Orlando in Orange County, Florida. The lakes are intensively used for fishing and water sports, but hydrila occupies 10-20% of the surface area. Middle Pool, the largest component of the chain, has an average diameter of 1.2 mi; the entire complex measures 1.9 by 2.8 mi, with a maximum depth of about 35 ft. To prevent reproduction, a monosex population (female) developed at the U.S. Department of the Interior Fish Farming Experiment Station in Stuttgart, Arkansas will be stocked. The first introduction of the fish is scheduled for March-April 1977, and background gathering of data at the stocking site is currently in progress, and will be continued for three years after stocking of the fish. The life span of the white amur is estimated at 12-15 years, and it is thought that as few as 12,000 fish will suffice to maintain desired plant control levels, which may be achievable in 3-5 years. A predictive model for environmental effects is currently being developed. (Lynch-Wisconsin)
W78-04747

CHEMICALS USED TO CONTROL FISH AND AQUATIC PLANTS IN ILLINOIS, I. AN EVALUATION OF FISH TOXICANTS.
Illinois Natural History Survey, Urbana. Aquatic Biology Section.
For primary bibliographic entry see Field 5G.
W78-04779

CHEMICALS USED TO CONTROL FISH AND AQUATIC PLANTS IN ILLINOIS, A REVIEW OF THE AQUATIC HERBICIDES USED IN ILLINOIS,
Illinois Natural History Survey, Urbana. Aquatic Biology Section.
For primary bibliographic entry see Field 5G.
W78-04780

PROBLEMS RELATED TO WATER QUALITY AND ALGAL CONTROL IN LOPEZ RESERVOIR, SAN LUIS OBISPO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 5G.
W78-04802

WATER SUPPLY AND WATER QUALITY CONTROL STUDY, STONEWALL JACKSON RESERVOIR, WEST FORK RIVER BASIN, WEST VIRGINIA.
Department of Health, Education, and Welfare, Wheeling, WV.; Army Engineer District, Pittsburgh, PA.
For primary bibliographic entry see Field 5G.
W78-04807

WATER SUPPLY AND WATER QUALITY CONTROL STUDY, BUCK CREEK RESERVOIR, MIAMI RIVER BASIN, OHIO,
Public Health Service, Charlottesville, VA. Region III.
For primary bibliographic entry see Field 5G.
W78-04808

THE SAMPLING ERROR OF STORAGE SIZE,
Monash Univ., Clayton (Australia). Dept. of Mathematics.
For primary bibliographic entry see Field 2E.
W78-04829

THE SMALL SAMPLE EXPECTATION OF POPULATION AND ADJUSTED RANGES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulics and Water Power.
For primary bibliographic entry see Field 2E.
W78-04830

THE SMALL SAMPLE EXPECTATION OF RESCALED POPULATION AND RESCALED ADJUSTED RANGES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulics and Water Power.
For primary bibliographic entry see Field 2E.
W78-04831

THE LOG PEARSON TYPE 3 DISTRIBUTION: THE T-YEAR EVENT AND ITS ASYMPTOTIC STANDARD ERROR BY MAXIMUM LIKELIHOOD THEORY,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2E.
W78-04832

OHIO RIVER POWER CURVE REGRESSION EQUATIONS,
Missouri Univ., St. Louis. Dept. of Physics.
For primary bibliographic entry see Field 2E.
W78-04835

PORTABLE, ADJUSTABLE FLOW-MEASURING FLUME FOR SMALL CANALS,
Agricultural Research Service, Phoenix, AZ. Water Conservation Lab.
For primary bibliographic entry see Field 8B.
W78-04844

BIG THOMPSON FLOOD EXPOSES NEED FOR BETTER FLOOD REACTION SYSTEM TO SAVE LIVES,
Colorado Univ., Boulder. Inst. of Behavioral Science.
For primary bibliographic entry see Field 6F.
W78-04852

BIG THOMPSON FLOOD DAMAGE WAS SEVERE, BUT SOME COULD HAVE BEEN PREVENTED,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6F.
W78-04853

WETLAND CLASSIFICATION AND MAPPING IN WESTERN TENNESSEE,
Geological Survey, Reston, VA. Water Resources Div., and Tennessee Valley Authority, Chattanooga.
V. Carter, A. Voss, D. Malone, and W. Godsey.
In: Proceedings of the 2nd Annual William T. Pecora Memorial Symposium, held in Sioux Falls, South Dakota, October 25-29, 1976: American Society of Photogrammetry, p 213-234, 1976. 4 fig, 6 tab, 15 ref.

Descriptors: *Wetlands, *Mapping, *Tennessee, *Aerial photography, *Classification, Remote sensing, Vegetation, Water levels, Marshes, Swamps, Analytical techniques, Tennessee Valley Authority, Tennessee Valley Region, Reelfoot Lake, Hatchie River, Duck River, White Oak Swamp.

The U.S. Geological Survey and the Tennessee Valley Authority are presently conducting a cooperative wetland mapping project in western Tennessee. Existing wetland classification systems were considered too general to supply needed management information, so a new system has been developed based primarily on vegetation, and frequency and duration of inundation. There are five forested wetland subclasses and seven nonforested wetland subclasses in the new system. High-altitude color infrared photography was acquired by the National Aeronautics and Space Administration during several seasons. This photography supplied the information on hydrologic boundaries and vegetation that is needed for classification and mapping. Seasonal informatiion was required to map the maximum number of categories. The methodology for separating and delineating classes was carefully documented. The stage (water level) was determined for the time of overflights for sites where gage stations are in operation. (Woodard-USGS)
W78-04863

PROGRESS REPORT TO THE ARKANSAS STATE HIGHWAY AND TRANSPORTATION COMMISSION FOR YEAR ENDING SEPTEMBER 30, 1977,
Geological Survey, Little Rock, AR. Water Resources Div.
For primary bibliographic entry see Field 8B.
W78-04868

SURFACE-WATER AND GROUND-WATER FEATURES, CLAY COUNTY, FLORIDA,
Geological Survey, Tallahassee, FL. Water Resources Div.
C. B. Bentley.
Available from National Technical Information Services, Springfield, VA 22161 as PB-276 119, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 77-87, August 1977. 59 p, 22 fig, 11 tab, 44 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Hydrology, *Florida, Hydrologic data, Water quality, Hydrogeology, Aquifer characteristics, Water wells, Water yield, Drawdown, Water levels, Groundwater recharge, Potentiometric level, Rainfall-runoff relationships, Streamflow, Flow rates, Water supply, Water users, Clay County(Fla).

Clay County is a rapidly growing area in northeastern Florida. Surface water largely is undeveloped except for recreational use. Black Creek is the largest fresh-water stream in the country and has an average discharge of about 515 cubic feet per second. However, excessive color, iron concentration, hardness, and pH often make the water objectionable for many asses. Water from the lakes and streams in the Etonia Creek basin in southwestern Clay County generally is of good chemical quality. Ground water occurs in the county in a water-table aquifer, secondary artesian aquifers, and the Floridan aquifer. Large withdrawals of water from the Floridan aquifer since the 1940's, especially in nearby metropolitan Jacksonville, have caused a decline of the potentiometric surface of up to 30 feet in the northeast corner of Clay County to less than 5 feet in the western part. The rate of decline in recent years at Orange Park has been about 0.7 of a foot per year. Ground water in the county generally is of good chemical quality and is suitable for most uses. (Woodard-USGS)
W78-04870

WATER RESOURCES DATA FOR FLORIDA, WATER YEAR 1976--VOLUME 3. SOUTHWEST FLORIDA.
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04871

A BRIEF INVESTIGATION OF THE SURFACE-WATER HYDROLOGY OF YEMEN ARAB REPUBLIC,
Geological Survey, Reston, VA. Water Resources Div.
H. C. Riggs.
Open-file report 77-150, 1977. 37 p, 16 fig, 3 tab, 16 ref.

Descriptors: *Hydrology, *Surface waters, *Foreign research, *Arid lands, *Ephemeral streams, Hydrologic data, Floods, Streamflow, Precipitation(Atmospheric), Alluvial channels, Investigations, Surveys, Evaluation, *Arabian Peninsula, *Yemen Arab Republic, Wadis.

Yemen, near the southwest tip of the Arabian Peninsula, is a mountainous country bordered by a desert on the east and a coastal plain on the west. Rainfall is low and seasonal; consequently, most streams (wadis) are ephemeral. The natural flow regimens of many of the smaller wadis are modified by terracing for agriculture. The only streamflow data available in Yemen are short records on four large wadis. A brief field investigation and application of reconnaissance techniques are the bases for the largely qualitative description of the hydrology, and for the proposal to collect streamflow data needed for orderly development of the expanding economy. (Woodard-USGS)
W78-04872

WATER RESOURCES OF THE BARONA, CAPITAN GRANDE, AND SYCUAN INDIAN RESERVATIONS, SAN DIEGO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04876

CAP UPDATE,
Bureau of Reclamation, Phoenix, AZ. Arizona Projects Office.
C. A. Pugh.
In: Proceedings of the 20th Annual Arizona Watershed Symposium, Arizona Water Commission, Report No 8, September 15, 1976, p 51-55. 14 ref, 1 append.

Descriptors: *Arizona, *Water supply, *Water resources development, *Water resources, Colorado River, Water rights, Competing uses, *Central Arizona Project, *Orme Dam, Indian water rights.

Progress on the Central Arizona Project is discussed. The various components of the project and their current status are presented. By 1977, $390 million had been appropriated for construction of the Central Arizona Project. This is approximately 25 percent of the total project cost at current price levels. The decision of the Secretary of the Interior to allocate Central Arizona Project water to central Arizona Indian tribes is cited as the most important single decision affecting the project. It paved the way for negotiations for the sale of CAP water to municipal, industrial, agricultural and other water-user agencies. The Orme Dam and Reservoir and its possible exclusion from the project is discussed. Negative publicity towards certain aspects of the CAP is described as a powerful weapon against the project. (See also W78-04934) (Jamail-Arizona)
W78-04940

THE ANALYSIS OF SMALL WATER DISTRIBUTION SYSTEMS,
Guam Univ., Agana. Water Resources Research Center.
For primary bibliographic entry see Field 8B.
W78-04943

EFFECTS OF SEASONABILITY AND VARIABILITY OF STREAMFLOW ON NEARSHORE COASTAL AREAS,
Alaska Univ., Inst. of Water Resources.
R. Seifert, and D. Kane.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 96-250, March 1977. 63 fig, 10 tab, 21 ref. 05-3-022-56.

Descriptors: *Baseline studies, *Resources development, *Streamflow, *Sea ice, Climate, Coasts, Oil pollution, Alaska, *Outer Continental Shelf, Seasonal variations, Pollutant transport.

This study examines the variability of streamflow in all gaged Alaskan rivers and streams which terminate in the ocean. The primary objective was the development of a characterization of coastal streams in Alaska which is relevant for engineering applications, useful to the imminent OCS petroleum development, and which may also be generally useful to as many other agencies, individuals, and commercial interest as may have need for such information. Presentation of the results of the statistical analyses and supplementary information is graphical wherever possible. Freeze-up and break-up information is tabulated. (Sinha - OEIS)
W78-04977

SNOW MAPPING, AND LAND USE STUDIES IN SWITZERLAND,
Zurich Univ. (Switzerland). Dept of Geography.
For primary bibliographic entry see Field 2C.
W78-05012

LAND USE CHANGE DETECTION WITH LANDSAT-2 DATA FOR MONITORING AND PREDICTING REGIONAL WATER QUALITY DEGRADATION,
Arkansas Univ., Fayetteville. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W78-05018

THE ROLE OF MINIMUM VARIANCE THEORY IN DEFINING THE REGIME CHARACTERISTICS OF THE LOWER NAMOI-GWIDIR DRAINAGE BASIN,
Macquarie Univ., Ryde (Australia). School of Earth Sciences.
For primary bibliographic entry see Field 2E.
W78-05019

A SIMPLE HYDRAULIC SIMULATOR,
Mekoroth Water Co. Ltd., Tel Aviv (Israel). Engineering Div.
For primary bibliographic entry see Field 8B.
W78-05020

A UNIFYING SET OF PROBABILITY TRANSFORMS FOR STOCHASTIC HYDROLOGY,
Agriculture Research Service, Athens, GA. Southeast Watershed Lab.
For primary bibliographic entry see Field 2E.
W78-05023

HICKORY CREEK DRY RESERVOIR: A COMPROMISE DESIGN FOR BOTH FLOOD CONTROL AND NATURAL AREA PROTECTION,
Illinois State Dept. of Transportation, Springfield. Div. of Water Resources.
D. T. Bell, and R. H. Smith.
Water Resources Bulletin, Vol. 14, No. 1, p 119-132, February 1978. 4 fig, 3 tab, 17 ref.

Descriptors: *Flood control, *Control structures, *Forests, *Illinois, Reservoirs, Design, Environment, Environmental effects, Trees, Floods, Flood damage, Water levels, Regime, Projects, Hydrology, *Will County(Ill), Dry reservoirs, Flood duration.

The proposed Hickory and Spring Creek Flood Control and Recreation Project of the Illinois State Division of Water Resources and the Will County Forest Preserve District was designed to provide flood control for Joliet, Illinois, and areas of the watershed to the east of the city and to provide open-space recreational land upstream from the Hickory Creek Dry Reservoir embankment. A viable forest ecosystem in the reservoir flood pool following construction was of major importance to the project. Factors of the environment influencing tree distribution and flood tolerance and a process for determining the best operational design to provide both flood control and the maintenance of a natural streamside forest ecosystem were described. (Sims-ISWS)
W78-05026

TRANSIENT DRAINAGE EQUATIONS FOR NON-HOMOGENEOUS SOILS,
South Dakota State Univ., Brookings. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2G.
W78-05033

ESTIMATING RUNOFF FROM FURROW IRRIGATION,
Kansas State Univ., Garden City. Garden City Experiment Station.
For primary bibliographic entry see Field 3F.
W78-05034

ASSESSMENT OF FLOOD AND EROSION ASSISTANCE PROGRAMS, RONDEAU COASTAL ZONE EXPERIENCE, LAKE ERIE,
Waterloo Univ. (Ontario). Dept. of Geography.
J. C. Day, J. A. Fraser, and R. D. Kreutzwiser.
Journal of Great Lakes Research, Vol. 3, No. 1-2, p 38-45, October 1977. 2 fig, 4 tab, 16 ref.

Descriptors: *Floods, *Erosion, *Coasts, *Programs, *Lake Erie, *Canada, Coastal structures, Flood protection, Flood control, Government supports, Government finance, Projects, Levees, Evaluation, Social aspects, Agriculture, Hazards, Flood waves, Lakes, Coastal engineering, *Ontario.

This paper evaluated the performance of major Canada and Ontario coastal hazard assistance programs applied during the 1972 and 1975 high-water period. Seven programs were described, and their effectiveness in helping residents and municipalities alleviate flooding and erosion in the Rondeau coastal zone along Lake Erie was examined. Data were obtained from a field survey designed to measure shore-dwellers' actions toward and adjustment to coastal hazards and their knowledge about an evaluation of assistance programs. Analysis revealed that while government actions reduced damages and maintained essential services, both the programs themselves and institutional arrangements governing their administration resulted in serious deficiencies: gross discrimination in assistance obtainable; widespread ignorance of programs available; over-emphasis on massive structural devices; over-reliance on stop-gap repair works; and piecemeal protection of shoreline reaches. Specific suggestions to help overcome the existing deficiencies and general approaches to improve the performance of future coastal hazard programs were recommended. (Sims-ISWS)
W78-05037

SHALLOW WAVE PROPAGATION IN OPEN CHANNEL FLOW,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-05045

LAKE ERIE BEGINNING-OF-MONTH WATER LEVELS AND MONTHLY RATES OF CHANGE OF STORAGE,
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
F. H. Quinn, and J. A. Derecki.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 816, Price codes: A03 in paper copy, A01 in microfiche. Report No. TR ERL 364-GLERL 9, February 1976. 38 p, 8 fig, 4 tab, 1 ref, 1 append.

Descriptors: *Lake Erie, *Great Lakes, *Water levels, Storage, Rates, Networks, Gages, Mathematical studies, Graphical analysis, Lakes, Water storage, Water resources, Water supply, Data processing, Water level fluctuations, Data collections, Monthly changes.

This report described the results of a study of Lake Erie beginning-of-month water levels and monthly changes of storage. The study established that the number and distribution of water level gages in the presently existing gage network are adequate for the computation of beginning-of-month water levels. Computed beginning-of-month water levels and changes of storage for the period 1900-1974 were listed for use in scientific and planning studies. (Froehlich-ISWS)
W78-05048

WETLAND INVENTORY, ONEIDA COUNTY, NEW YORK,
Oneida County Environmental Management Council, Utica, NY.
For primary bibliographic entry see Field 6G.
W78-05099

IMPACT OF WATER LEVEL CHANGES ON WOODY RIPARIAN AND WETLAND COMMUNITIES. VOLUME II: THE SOUTHERN FOREST REGION,
Missouri Univ.-Columbia. School of Forestry, Fisheries and Wildlife.
For primary bibliographic entry see Field 6G.
W78-05102

IMPACT OF WATER LEVEL CHANGES ON WOODY RIPARIAN AND WETLAND COMMUNITIES. VOLUME III: THE CENTRAL FOREST REGION,
Missouri Univ.-Columbia. School of Forestry, Fisheries and Wildlife.
For primary bibliographic entry see Field 6G.
W78-05103

AN OVERVIEW OF THE EFFECT OF LAKE POWELL ON COLORADO RIVER BASIN WATER SUPPLY AND ENVIRONMENT,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
G. C. Jacoby, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 748, Price codes: A03 in paper copy, A01 in microfiche. Report NSF-RA-E-75-182, Lake Powell Research Project Los Angeles, Calif., Bulletin, No. 14, November 1975. 31 p, 4 fig, 21 ref. NSF/RANN GI-34840.

Descriptors: *Lake Powell(UT AZ), *Colorado River Basin, *Reservoirs, *Environmental effects, *Water storage, *Water supply, *Recreation, Utah, Arizona, Multiple-purpose reservoirs, Lakes, Hydroelectric power, River basin development, Glen Canyon(UT), Water demand, Regional development, Rivers, Cost-benefit analysis.

An analysis of the effects of Lake Powell reservoir in southeastern Utah on water supply in the Colorado River Basin and on the environment is given. The multiple-purpose reservoir was created in 1963 for water storage, hydroelectric power generation, and recreation, and is capable of containing 80% of the total Upper Colorado River Basin water storage of 33.6 million acre-feet. In assessing environmental impact, three zones must be distinguished: (1) the local area around the lake; (2) the Upper Basin above Lee Ferry, Arizona; and (3) the Lower Basin below Lee Ferry. Initial local impact has been very great in terms of noise, air, and water pollutin due to recreational use and because of inundation of scenic areas. But the most significant long-term effects will be on the growth of the rest of the basin as a result of the lake's influence on water supply. In the Upper Basin the maor effect will be construction of various facilities for production of food, fiber, and energy, with associated increases in energy-related pollution and in salination from agriculture. After about ten years of rapid development surface water resources will be spent, and growth may be sharply curtailed. Upper Basin consumptive uses will reduce releases to the Lower Basin to the legal minimum. A nongrowth, static situation could develop in the Lower Basin unless there is more efficient management of current water supplies or development of alternative sources. (Lynch-Wisconsin)
W78-05131

MANAGEMENT OF SCIENTIFIC COLLABORATION IN THE LAKE POWELL RESEARCH PROJECT,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
O. L. Anderson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 747, Price codes: A03 in paper copy, A01 in microfiche. Report NSF-RA-E-75-180, Lake Powell Research Project Bulletin, October 1976. 19 p, 4 tab, 7 ref. NSF AEN72-3470-A03.

Descriptors: *Lake Powell(UT AZ), *Scientific personnel, *Management, *Lake Powell Research Project, *Reservoirs, *Multidisciplinary research, *Research priorities, Utah, Arizona, Multiple-purpose reservoirs, Energy, Water management(Applied), Lakes, Colorado River Basin, Environmental effects, Regional planning, Water utilization.

An evaluation of problems of operating a multidisciplinary research consortium dealing with regional environmental impact discusses advantages and disadvantages of vesting policy-making power in a steering committee rather than a project director. The Lake Powell Research Project (LPRP) is concerned with energy and water management problems in the Colorado River Basin in the Four Corners region. A major difficulty of such a consortium was establishing and maintaining a balance between social science and natural science disciplines. Problems to be overcome included selection of disciplines, setting priorities in disciplines, establishing the multidisciplinary peer group, communication of research results, and integration of disciplines. The LPRP steering committee is composed of selected senior investigators of the project, and although first-year funding (summer 1971) was granted only to the natural sciences, an early committee decision was to strive for equal representation of natural and social science disciplines in the project, a goal achieved by 1973 with 13 scientists from each roup. Three committee members are appointed to solve day-to-day problems: Coordinator of Natural Sciences, Coordinator of Social Sciences, and Executive Secretary. The Committee itself assumed responsibility for guiding the evolution of the project; approving new senior personnel on existing subprojects; realigning old subprojects; and controlling publications and publicity. (Lynch-Wisconsin)
W78-05132

SYMPOSIUM ON WATER RESOURCES MANAGEMENT IN A CHANGING WORLD, INTRODUCTION: WORLD TRENDS AND NEED,
Colorado Univ., Boulder. Inst. of Behavioral Science.
For primary bibliographic entry see Field 6E.
W78-05133

GROUND WATER 'FLOOD' POSSIBLE IN DOWNTOWN LOUISVILLE, KENTUCKY.
Water Well Journal, Vol. 32, No. 2, p 60, February, 1978.

Descriptors: *Water levels, *Water table, Floods, Pumping, Observation wells, Ohio River, *Kentucky, New York, Missouri.

Ground water levels in downtown Louisville, Kentucky have risen as much as 32 feet in the past five years according to USGS hydrologists. The rise, which is attributed to recent decreases in ground water pumping and use combined with unusually wet winters and leaking sewer and water mains, could lead to flooded basements and cause structural damage by 1982. The situation is further aggravated by the 25-foot increase in the 'pool level' of the Ohio River created by navagitional locks and dams. If ground water levels continue to rise, they will be within 20 feet of the land surface by 1982, as compared to 80 feet below land surface during the late 1950's. The Kentucky Geological Survey, in conjunction with the USGS, has established 16 observation wells to monitor the situation. Currently water levels are 40 feet below land surface. Possible solutions include increased pumping of ground water and construction and maintenance of wells and pumps in affected buildings to handle individual problems that arise. The situation is similar to that of Long Island and Brooklyn, New York where pumping reductions have resulted in flooding and foundation damage. St. Louis, Missouri has experienced over one million dollars in damage to sewer lines since 1973 because of rising ground water levels. USGS Water Resources Investigation Report No. 77-92 by Kernodle and Whitesides further details Louisville's plight. (Palmer-NWWA)
W78-05196

4B. Groundwater Management

WELL INJECTION INTO A TWO-PHASE FLOW FIELD: A HELE-SHAW MODEL INVESTIGATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5E.
W78-04709

EVALUATION OF GROUNDWATER RESERVES IN THE SANTA CRUZ VALLEY AREA, PIMA AND SANTA CRUZ COUNTIES, ARIZONA,
Arizona Univ., Tucson. Dept. of Geosciences.
J. S. Sumner.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 372, Price codes: A02 in paper copy, A01 in microfiche. Completion Report, January 1978. 4 p, 5 ref. OWRT A-078 ARIZ(1). 14-34-0001-7005 and -7006.

Descriptors: *Gravity, *Geophysical exploration, *Groundwater resources, Evaluation, *Arizona, *Santa Cruz Valley(Ariz).

The gravity method of geophysical exploration was used to determine the groundwater potential in the upper Santa Cruz Valley, in Santa Cruz County, Arizona. The northern part of this valley has a north-south trend, but the southern part trends south-southeasterly. Mountain ranges border the valley both to the east and to the west. Interpretation of the reduced gravity data reveals three anomalous low gravity areas along the main Santa Cruz Valley. The northernmost low, near Amado, is part of the Tucson basin gravity anomaly. Preliminary modeling of the southerly anomalies indicates a depth to bedrock of approximately 3000 feet. Additional modeled profiles will reveal the subsurface structure more accurately for the purpose of evaluating groundwater resources. The Santa Cruz river is the largest drainage system which empties into the Tucson basin. The City of Tucson is totally dependent on groundwater to supply its water needs, and it is important to assess any contributing underflow into the Tucson basin. The gravity method of geophysical exploration has relatively efficient in the search for water resources. In the Basin and Range physiographic province of the southwestern United States, gravity surveys have indicated the presence of the buried scarps which define the course of deep alluvial valleys. The more porous valley-fill alluvium has a lower density than the impermeable bedrock; thus gravity mapping can reveal the depth to higher density bedrock.
W78-04819

A MODIFIED OPTIMIZATION METHOD OF ESTIMATING AQUIFER PARAMETERS,
United Nations Centre for Natural Resources, Energy, and Transport, New York. Dept. of Economic and Social Affairs.
For primary bibliographic entry see Field 2F.
W78-04826

EXPERIMENTAL EVALUATION OF THEORETICAL SOLUTIONS FOR SUBSURFACE DRAINAGE AND IRRIGATION,
North Carolina State Univ. at Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2G.
W78-04828

IRRIGATION IN THE ALLUVIAL PLAIN OF NORTHWESTERN MISSISSIPPI, 1975,
Geological Survey, Jackson, MS. Water Resources Div.
For primary bibliographic entry see Field 3F.
W78-04861

GROUND-WATER RESOURCES OF POSEY COUNTY, INDIANA,
Geological Survey, Mineola, NY. Water Resources Div.
T. M. Robison.
Indiana Department of Natural Resources (Indianapolis), Bulletin No 39, 1977. 27 p, 6 fig, 4 plates, 2 tab, 18 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Groundwater availability, *Water quality, *Indiana, Hydrogeology, Observation

wells, Water levels, Water yield, Groundwater movement, Groundwater recharge, Rainfall, Water analysis, Chemical analysis, Posey County(Ind).

Glacial sand and gravel deposits in and near the Wabash and Ohio River valleys of Posey County, Ind., are capable of yielding from 50 to more than 1,000 gallons per minute of water to individual wells. In the tributary valleys as much as 80 gallons per minute has been obtained from small, isolated sand and gravel deposits. In the remainder of the county, wells in sandstones of Pennsylvanian age yield from 5 to 25 gallons per minute. Natural discharge from sand and gravel into the Wabash and Ohio Rivers is estimated to be 40 million gallons per day, far exceeding the 6 million gallons per day estimated usage of ground water in the county. The shallow ground water is normally of the calcium bicarbonate type and has a dissolved-solids concentration of less than 500 parts per million. In deep bedrock wells, the water is of the sodium bicarbonate sodium chloride type and has a dissolved-solids concentration of more than 500 parts per million. (Woodard-USGS)
W78-04862

GROUND-WATER RESOURCES OF CHESTER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, PA. Water Resources Div.
L. J. McGreevy, and R. A. Sloto.
Water-Resources Investigations 77-67 (open-file report), September 1977. 76 p, 14 fig, 6 plates, 8 tab, 51 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Surface-groundwater relationships, *Remote sensing, *Pennsylvania, Hydrologic data, Hydrogeology, Water quality, Aerial photography, *Mapping, Well data, Water yield, Hydrologic budget, Chester County(Pa), LANDSAT imagery.

Fifty gallons per minute (3 liters per second) or more may be obtained from wells in most parts of Chester County, Pa. Five hundred gallons per minute (30 liters per second) or more may be obtained from some of the carbonate rocks. Linear features, but not all, have geologic or hydrologic significance, and some may indicate fractured rock that might be tapped by wells. Dissolved-solids concentration of most groundwater in the county is less than 500 milligrams per liter. Chemical-quality problems are predominantly caused by acidity, iron and manganese, or nitrate. Base (ground-water) runoff during a near-average year, 1968, was about 420 million gallons per day (18 cubic meters per second). (Woodard-USGS)
W78-04869

SURFACE-WATER AND GROUND-WATER FEATURES, CLAY COUNTY, FLORIDA,
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-04870

WATER RESOURCES DATA FOR FLORIDA, WATER YEAR 1976--VOLUME 3. SOUTHWEST FLORIDA.
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04871

HYDROLOGIC EVALUATION OF THE ARIKAREE FORMATION NEAR LUSK, NIOBRARA AND GOSHEN COUNTIES, WYOMING,
Geological Survey, Cheyenne, WY. Water Resources Div.
M. A. Crist.
Water-Resources Investigations 77-111 (open-file report), October 1977. 23 p, 9 fig, 3 plates, 13 ref.

Descriptors: *Aquifer characteristics, *Groundwater resources, *Hydrogeology, *Wyoming, *Water utilization, Water wells, Model studies, Pumping, Water yield, Groundwater recharge, Water levels, Potentiometric level, Irrigation wells, Surface-groundwater relationships, Transmissivity, Drawdown, Mapping, Contours, Evaluation, Groundwater availability, *Computer models, *Arikaree Formation(Wyo).

The Arikaree Formation of early Miocene age is an aquifer of large areal extent and is composed of very fine grained, poorly bedded, loosely to moderately cemented sandstone and interbedded silt, limestone, and many concretionary layers. The area studied is about 800 square miles in southern Niobrara and northern Goshen Counties of Wyoming. Long-term average annual recharge to the aquifer from streams and precipitation is estimated to total about 24,270 acre-feet. Pumpage from public-supply and irrigation wells is estimated to have totaled about 48,000 acre-feet from 1938 through 1972. This pumpage did not cause any noticeable decrease in natural discharge and it is assumed there has been no significant change in ground-water storage. Pumpage is estimated to total about 39,500 acre-feet for the 3-year period 1973 through 1975. A digital model was developed to simulate the ground-water system in the Arikaree Formation. The model can be used to indicate the general effect of applying hydraulic stresses to the aquifer. (Woodard-USGS)
W78-04873

GROUND-WATER RESOURCES OF COLQUITT COUNTY, GEORGIA,
Geological Survey, Doraville, GA. Water Resources Div.
E. A. Zimmerman.
Open-file report 77-56, June 1977. 41 p, 10 fig, 6 tab, 23 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Hydrogeology, *Water yield, *Water quality, *Georgia, Surveys, Water supply, Water wells, Irrigation, Groundwater availability, Planning, Water demand, Water resources development, Water analysis, Chemical analysis.

Colquitt County, Georgia, is predominantly agricultural, but has some light industry. Anticipated growth in industrial activity and an increase in irrigation will impose some additional strains on the water supply. Streams in the county generally are undependable as sources of water, so wells are the principal source for domestic, municipal, and industrial uses. The abundant supply of ground water is generally of good quality. The most productive sources are limestone beds of Eocene, Oligocene, and Miocene age that make up the principal artesian aquifer. These beds can yield in excess of 1,000 gal/min of water to wells. The ability to transmit water to wells is modified by a structural, or a paleogeographic feature called the Suwannee strait, which extends from near the southwest corner through the northeast part of Colquitt County. In this strait limestone beds seem to be partly replaced by marl, which greatly impairs their transmissivity. Aquifer tests suggest that the transmissivity of the principal artesian aquifer is as much as 10 times as great southeast of the strait as it is to the northwest. A shallow depression in the potentiometric surface of the principal artesian aquifer near the center of heaviest pumping at Moultrie seems to parallel the hypothesized northeast-trending Ochlockonee fault, and may reflect enhanced anisotropic transmissivity. (Woodard-USGS)
W78-04875

WATER RESOURCES OF THE BARONA, CAPITAN GRANDE, AND SYCUAN INDIAN RESERVATIONS, SAN DIEGO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
W. R. Moyle, Jr., and R. L. Blazs.
Open-file report 77-289, October 1977. 33 p, 1 fig, 3 plates, 11 tab, 10 ref.

Descriptors: *Groundwater resources, *Streamflow, *Water quality, *Indian reservations, *California, Hydrologic data, Basic data collections, Chemical analysis, Water wells, Water levels, Drillers logs, Reservoirs, Evaluation, *Barona Indian Reservation, *Capitan Grande Indian Reservation, Sycuan Indian Reservation, *San Diego County(Calif).

The Barona and Capitan Grande Indian Reservations, California, have sufficient water to satisfy present (1976) domestic and stock needs; however, the Sycuan Indian Reservation is experiencing a shortage of water for domestic supply because of the decline of the water table beneath the reservation well field and a general decline of the water table surrounding the reservation. The water quality on the three reservations is generally good; however, the water is at or near land surface in several areas. This shallow water could be subject to contamination by animal waste, septic tanks, or farming operations. Historical hydrologic data were obtained from government agencies and private individuals, and all wells and springs on the reservations were visited. This report summarizes the data collected and the findings of the study. (Woodard-USGS)
W78-04876

SURFACE CHEMICAL PROCESSES IN GROUND-WATER SYSTEMS,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 2F.
W78-04877

WATER-LEVEL DECLINES, LAND SUBSIDENCE AND EARTH FISSURES IN SOUTH-CENTRAL ARIZONA,
Geological Survey, Phoenix, AR. Water Resources Div.
R. L. Laney.
In: Arizona Water Commission Report No 8; Proceedings of 20th Annual Arizona Watershed Symposium, September 15, 1976, Phoenix, Arizona: Arizona Water Commission, p 30-39, 1976. 8 fig, 5 ref.

Descriptors: *Alluvial aquifers, *Drawdown, *Land subsidence, *Fissures(Geologic), *Arizona, Groundwater, Withdrawal, Irrigation, Water levels, Groundwater recharge, South-central Arizona, *Salt River Valley(Ariz), *Lower Santa Cruz River basin(Ariz).

The Salt River Valley and the lower Santa Cruz River basin have the largest concentrations of agricultural land and population in the State of Arizona. More than 109 million acre-feet of ground water was withdrawn from the underlying alluvial deposits in 1915-75. The volume of water pumped greatly exceeds the volume of natural recharge. As a result, water levels have declined in most places. In 1923-72 water levels declined more than 300 feet in most of the report area, and the greatest amount of decline was 460 feet near Stanfield. In 1972-76 water levels declined about 100 feet near Queen Creek. The land surface has subsided and earth fissures have formed as a result of the water-level declines. Land-surface level data for 1948-67 show as much as 7 feet of subsidence near Eloy; more than 3 feet near Stanfield, east of Mesa, and at Queen Creek; 2 feet west of Luke Air Force Base; and about 0.5 foot in Scottsdale. Earth fissures have formed in the alluvial deposits near the areas of large waterlevel decline. The fissures may be less than 1 inch wide when first formed but may widen to a few tens of feet owing to erosion by overland flow. The fissures are particularly well developed between the Casa Grande and Picacho Mountains; near the Picacho Mountains, differential subsidence of more than 1.5 feet has been measured on either side of a prominent fissure.

Land subsidence and earth fissures have damages roads, streets, railroads, canals, irrigation-distribution systems, wells, and farmland. (See also W78-04934) (Woodard-USGS)
W78-04878

GROUNDWATER FLOW IN WEATHERED GRANITE IN THE TAMNE BASIN, NORTH EAST GHANA,
Council for Scientific and Industrial Research, Accra (Ghana).
T. T. Akiti.
February, 1977. 16 p, 8 fig, 12 ref.

Descriptors: *Groundwater, *Base flow, *Groundwater movement, *Africa water sources, Water supply, Subsurface waters, Irrigation, Mathematical models, Groundwater potential, Potential flow, Piezometry, Hydrogeology, Groundwater availability, Tamne Basin, Ghana.

Groundwater flow studies have been found to aid in predicting the response of the groundwater regime and hydrogeologic environment to superimposed natural and artificial stresses. This study makes use of fluid potential distribution in wells in the analysis of groundwater flow in a weathered zone in granite in a subsahel region of Africa, the Tamne Basin in northeastern Ghana. The theory to be applied in the study is described in a mathematical model. Depth to water level from the ground surface in a number of wells of depth range from 80 feet to 90 feet have been plotted and contoured. The mathematical model as a useful tool in mapping groundwater is discussed. It is concluded that groundwater flow in the weathered granites of the Tamne Basin is generated by differences in fluid potential and the flow follows approximately the topographic surface. Since the movement of groundwater is away from the land surface in a recharge area and is towards the land surface in a discharge area, the most probable areas for groundwater exploitation would be the areas of upward flow of groundwater. (Jamail-Arizona)
W78-04923

WATER: THE WELLS NEED NEVER RUN DRY,
A. van Dam.
The Futurist, Vol XI, No 3, p 163-167, June 1977.

Descriptors: *Subsurface waters, *Water quality, *Water supply, *Groundwater resources, *Water distribution, *Water management, *Water shortage, Water allocation, Water storage, Reclaimed water, Arid lands.

Because water is unevenly distributed, critical shortages occur in many countries, especially in arid and semi-arid regions. The author, who recently attended the United Nations Water Conference in Mar del Plato, Argentina, believes the trend of the future and solution to the water crisis will come primarily from increasing emphasis placed on tapping underground reservoirs and desalination of seawater. The solution will also involve judicious water management, Several examples of water management projects and policies are surveyed and discussed. (Castricone-Arizona)
W78-04929

GEOPHYSICAL INVESTIGATIONS OF GROUNDWATER RESOURCES IN THE KALAHARI BASIN,
Council for Scientific and Industrial Research, Pretoria (South Africa), National Physical Research Lab.
F. Worthington.
Geophysics, Vol 42, No 6, p 838-849, June 1977. 9 fig, 4 tab, 20 ref.

Descriptors: *Borehole geophysics, *Electrical studies, Surveys, *Aquifers, Geology, Groundwater availability, *Groundwater resources, Boreholes, Africa, *Kalahari Basin(So Afr), Dar Zarrouk Parameters.

A regional geoelectric survey of a semiarid region 4000 Km2 and approximately 300 km NNE of windhoek was conducted to establish a basis for the siting of boreholes in the area to contribute to a controlled development of existent and needed groundwater resources. The geoelectrical data obtained added to groundwater head levels, degree of penetration, production characteristics of the boreholes, and chemical analyses of water samples indicated that the calcareous sands and sandstones of assumed middle Kalahari age constitute a major aquifer in terms of higher sustained yields of good quality water. By correlating a major aquifer in terms of higher sustained yields of good quality water. By correlating these characteristics with geoelectrically derived thickness, resistivity and transverse resistance, it was possible to delineate the most promising areas for future groundwater development. In addition, Dar Zarrouk Parameters were shown to form the basis of a suggested procedure for optimizing initial groundwater exploration in similar regions lacking lithostratigraphic information (Payton-Arizona)
W78-04931

PROCEEDINGS OF THE 20TH ANNUAL ARIZONA WATERSHED SYMPOSIUM,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 4D.
W78-04934

ARIZONA'S GROUNDWATER RESOURCES, SUPPLIES AND PROBLEMS,
Arizona Water Commission, Phoenix.
P. C. Briggs.
In: Proceedings of the 20th Annual Arizona Watershed Symposium, Arizona Water Commission, Report No 8, September 15, 1976, p 11-21. 9 fig, 1 tab.

Descriptors: *Arizona, *Groundwater mining, *Groundwater movement, *Groundwater availability, Groundwater barriers, Groundwater, Groundwater basins, Groundwater resources, Groundwater potential, Aquifers, Water supply, Water sources, Water storage, Arid lands, Alluvial aquifers.

A discussion of the general occurrence, movement and nature of groundwater, the characteristics of Arizona's groundwater supplies, and the problems arising from its use are presented. The areas and amounts of groundwater in Arizona are described. Arizona's economy would have been limited to a much lower level of activity were it not for the ready availability of groundwater resources. In many areas, groundwater is the only supply. Although Arizona's groundwater reserves are large in aggregate, there are many limiting factors to their utilization as supplies. The problems of groundwater mining and discussed. Arizona's principal and most fundamental water problem is that of imbalance between supply and use. For years Arizonas have been using water more rapidly than it is being replenished. (See also W78-04934) (Jamail-Arizona)
W78-04936

THE SIGNIFICANCE OF GROUNDWATER LEVEL DECLINES IN EASTERN PIMA COUNTY, ARIZONA,
Tucson Water and Sewers Dept., AZ.
J. J. Wright, and R. B. Johnson.
In: Proceedings of the 20th Annual Arizona Watershed Symposium, Arizona Water Commission Report, No 8, September 16, 1976, p 22-29. 5 fig, 1 ref.

Descriptors: *Groundwater, *Groundwater mining, *Groundwater availability, *Groundwater resources, Water supply, Arizona, Subsurface waters, Water levels, Water table, Groundwater, Basins, Wells, Pumping, Land subsidence, Subsidence, *Tucson(Ariz).

The city of Tucson, Arizona is one of the largest cities in the United States that is totally dependent on groundwater. There are no surface waters from which the Tucson water utility may draw to meet the needs of the people. The decline of groundwater in the eastern portion of Pima County, in which Tucson is located, is discussed. The locations of water table decline in various portions of Tucson are charted and the significance of this decline explained. One of these is that as pumping levels are lowered, the costs associated with lifting any given quantity of water increase. Another consideration is the possibility of encountering deep groundwater with higher ionic concentrations and elevated temperatures in some areas when these deep zones are penetrated. Groundwater declines in the Tucson basin are now beginning to approach those magnitudes outlined by the U.S. Geological Survey as being potential for land surface subsidence. This is a major reason why the pattern of water withdrawal must be shifted by increasing the percentage of water pumped in the nearby Avra Valley and decreasing the amount pumped from the interior well field subjacent to the main city area. Future projected water declines until 1980 are presented. The period from 1977 to 1982 will be an extremely critical period for the water utility in Tucson. (See also W78-04934) (Jamail-Arizona)
W78-04937

GEOTHERMAL ENERGY IN THE PACIFIC REGION,
Colorado School of Mines, Golden.
L. L. Gross, and G. V. Keller.
Available from the National Technical Information Service, Springfield, VA 22161 as ADB-006 304, Price codes: A09 in paper copy, A01 in microfiche. May, 1975. 171 p, 1 fig, 1 tab, 17 pl, 111 ref, 3 append. N00014-71-A-0430-0004.

Descriptors: *Geothermal studies, *Thermal springs, Heatflow, Volcanoes, Maps, Exploration, Energy, Geology, Geophysics, Geochemistry, Electric power production, Thermal powerplants, Costs, Pacific region, United States Naval research, Tectonics, *Geothermal reservoirs.

A study of the Intra - and Circum - Pacific region was made for delineation of areas that appear to warrant exploration for geothermal energy sources which may be utilized by the United States Navy. As part of the study, basic tectonic, volcanic, heat flow, and thermal spring data were plotted on regional Pacific quadrant maps which have been included in this final report. Several areas were located which suggest potential. The roles of geology, geophysics, and geochemistry in geothermal energy exploration are briefly described. It is pointed out that geothermal energy is presently being converted to electricity at eight sites in the Pacific Region. In addition, costs for geothermal exploration, development, and electricity generation are outlined. (Castricone-Arizona)
W78-04942

WATER SUPPLY DILEMMAS OF GEOTHERMAL DEVELOPMENT IN THE IMPERIAL VALLEY OF CALIFORNIA,
California Univ., Livermore. Lawrence Livermore Lab.
D. W. Layton.
Water Resources Bulletin, Vol. 14, No. 1, p 133-143, February 1978. 4 fig, 22 ref. ERDA W-7405-ENG-48.

Descriptors: Water resources, *Geothermal studies, *Thermal powerplants, *California, Powerplants, *Cooling water, *Water supply, Water requirements, Consumptive use, Rivers, Groundwater, Brackish water, Water policy, *Imperial Valley(Calif), *Salton Sea(Calif), Geothermal development, Geothermal energy.

There are four known geothermal resource areas in the Imperial Valley that have a combined potential of over 4,000 megawatts of electrical energy for 25 years. Water resources available to support geothermal energy development are imported Colorado River water, agricultural waste waters, Salton Sea water, and groundwater. In addition, geothermal power plants can produce their own cooling water from steam condensate. Nevertheless, the relatively high water requirements of geothermal facilities along with a series of real and potential constraints may cause water supply dilemmas involving both the acquisition and use of cooling water. Important constraints are institutional policies, water supply costs, technical problems, and impacts upon the Salton Sea. These constraints and related dilemmas were examined in light of relevant information on the valley's water resources, geothermal resources and energy technologies, cooling water requirements, and water supply options. (Sims-ISWS)
W78-05028

DETERMINATION OF TRANSPORT MODEL PARAMETERS IN GROUNDWATER AQUIFERS,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Soil and Water Engineering.
For primary bibliographic entry see Field 5B.
W78-05043

RESULTS OF INTERFERENCE TESTS FROM TWO GEOTHERMAL RESERVOIRS,
California Univ., Berkeley. Lawrence Berkeley Lab.
P. A. Witherspoon, T. N. Narasimham, and D. G. McEdwards.
Journal of Petroleum Technology, Vol 30, No 1, p 10-16, January, 1978. 10 fig, 3 tab, 7 ref.

Descriptors: *Interference tests, *Geothermal studies, Thermal water, Reservoirs, Water pressure, Pressure head, Pressure measuring instruments, Artesian wells, Boundaries(Surfaces), Drawdown, Gravity, Earth tides.

This paper reviews the results of interference tests performed with a highly sensitive pressure measuring device. The interference tests involved fluid production from geothermal wells and the measure of pressure transents in nearby observation wells at two sites: the Raft River Valley Field in Idaho and the East Mesa Field in the Imperial Valley of California. A key piece of equipment used in the tests was a downhole quartz pressure gauge capable of measuring in-situ absolute pressure with an accuracy of 0.01 psi ranging from 0 to 10,000 psi. The high resolution of pressure data collected made various noise effects noticeable; effects of earth tides had to be taken into account at Raft Rivrr, while nonlinear regression techniques were necessary to smooth out noise at East Mesa before assessing reservoir performance. Major emphasis was placed on drawdown data as opposed to pressure buildup, with type curves and the asympototic solution employed for analysis. Experience gained in these tests indicates future promise for accurate long-range estimates of geothermal reservoir parameters and determination of reservoir geometry. (Eberle-NWWA)
W78-05183

WATER ALLOCATION BILLS PASSED BY SOUTH DAKOTA LEGISLATURE.
For primary bibliographic entry see Field 6E.
W78-05186

HOW MUCH IS ENOUGH. A MINIMUM WELL FORMULA,
National Water Well Association, Worthington, OH.
For primary bibliographic entry see Field 8B.
W78-05190

POSSIBLE ENERGY SAVINGS IN IRRIGATION,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
J. R. Gilley, and D. G. Watts.
American Society of Civil Engineers Journal of the Irrigation and Drainage Division, Vol. 103, No. IR4, p 445-457, December, 1977. 3 fig, 6 tab, 20 ref, 2 append.

Descriptors: *Irrigation practices, *Irrigation efficiency, *Pumping, Energy, Sprinkler irrigation, Water reuse, Center pivot systems, Water pressure, Farm equipment, Fertilizers, Nitrogen compounds, Nebraska.

Studies in Nebraska have shown that over 40% of all the energy consumed by production agriculture is used for pumping water from wells, which supply about 80% of the irrigation water requirements. Reduction of energy used in irrigation pumping would thus have significant impact. Six procedures, utilized singly or in various combinations, show strong energy-saving potential: (1) increased irrigation efficiency--better design and management of center pivot and surface systems; greater use of trickle, subsurface, runoff reuse systems as rising fuel prices make them cost effective; (2) improved pumping plant efficiency; (3) reduced water pumping--advances in irrigation scheduling; (4) lowering pressure of sprinkler systems; (5) scheduling to decrease electric peak demand, and; (6) minimizing nitrogen fertilizer losses due to deep percolation--fertilizer is conserved through irrigation scheduling, thus conserving the energy used in its manufacture. Energy savings of 40%-50% are considered attainable through these procedures. (Eberle-NWWA)
W78-05191

CASING STORAGE CAN AFFECT PUMPING TEST DATA,
Universal Oil Products, St. Paul, MN. Johnson Div.
For primary bibliographic entry see Field 8B.
W78-05193

DRINKING WATER AND HUMAN HEALTH,
National Water Well Association, Worthington, OH.
For primary bibliographic entry see Field 5A.
W78-05195

GROUND WATER 'FLOOD' POSSIBLE IN DOWNTOWN LOUISVILLE, KENTUCKY.
For primary bibliographic entry see Field 4A.
W78-05196

REGIONAL GEOLOGY SERIES: PART 2, HIGH PLAINS GROUND WATER REGION,
National Water Well Association, Worthington, OH.
For primary bibliographic entry see Field 2F.
W78-05199

4C. Effects On Water Of Man's Non-Water Activities

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE WATER: PART I. SOIL-WATER QUALITY AND VEGETATIVE RESPONSES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-04704

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE WATER: PART II, SOIL PHYSICAL AND CHEMICAL CHANGES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-04705

INFLUENCE OF ROAD SALTING ON THE NUTRIENT AND HEAVY METAL LEVELS IN STREAM WATER,
New Mexico Univ., Albuquerque. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W78-04708

EFFECTS OF AN URBAN ROAD SYSTEM ON LEAD CONTENT OF AN URBAN WATER SUPPLY SOURCE,
Massachusetts Univ., Amherst. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04711

GRASSED WATERWAY DESIGN,
Soil Conservation Service, Kendallville, IN. Area II.
For primary bibliographic entry see Field 4D.
W78-04730

PROGRESS REPORT TO THE ARKANSAS STATE HIGHWAY AND TRANSPORTATION COMMISSION FOR YEAR ENDING SEPTEMBER 30, 1977,
Geological Survey, Little Rock, AR. Water Resources Div.
For primary bibliographic entry see Field 8B.
W78-04868

APPLICATION OF RESIDUALS MANAGEMENT FOR ASSESSING THE IMPACTS OF ALTERNATIVE COAL-DEVELOPMENT PLANS ON REGIONAL WATER RESOURCES,
Geological Survey, Reston, VA. Water Resources Div.; and Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 6A.
W78-04879

IRRATIONAL LAND USE AND DESERTIFICATION IN RAJASTHAN DESERT,
Central Arid Zone Research Inst., Jodhpur (India).
H. S. Mann, S. P. Malhotra, and R. A. Shankarnarayon.
Annals of Arid Zone, Vol. 16, No. 3, p 387-394, September 1977. 4 tab, 6 ref.

Descriptors: *Deserts, *Land use, *Deterioration, Land management, Soil conservation, Cultivated lands, Farm management, Erosion control, Agricultural engineering, Livestock, Ecosystems, Conservation, Arid lands, India(Rajasthan).

Existing land use practices in the Rajasthan are discussed. Soil fertility, agricultural patterns, livestock population and grazing pressure and fuel consumption are seen to provide ample evidence to illustrate how the arid eco-system is slowly but inexorably degrading beyond ecological capability and resilience, leading to a state of eutropy in the arid regions of Rajasthan. Conservation of land resources is urged. (Payton-Arizona)
W78-04924

FRESHWATER AND THE FLORIDA COAST: SOUTHWEST FLORIDA,
State Univ. System of Florida Sea Grant Program, Gainesville; and Southwest Florida Water Management District, Brooksville.
For primary bibliographic entry see Field 2L.
W78-04973

THE ROLE OF VEGETATION IN STABILIZING THE LOWER GREAT LAKES CANADIAN SHORELINE,
Acres Consulting Services Limited, Niagara Falls (Ontario). Environmental Dept.
For primary bibliographic entry see Field 4D.
W78-05038

1975 WORLD SURVEY OF CURRENT RESEARCH AND DEVELOPMENT ON ROADS AND ROAD TRANSPORT.
International Road Federation, Washington, DC.
Prepared for Dept. of Transportation, Federal Highway Administration, Washington, D.C., December 1975. 744 p, 110 fig, 9 tab, 56 ref, 1 append. DOT-FH-11-7656.

Descriptors: *Highways, *Roads, *Transportation, *United States, Surveys, Research and development, Reviews, Foreign countries, Foreign research, Projects, Programs, *International.

An annual report was presented by the International Road Federation (IRF) for the year 1975 on its continuing international survey of current research and development on roads and road transport. The report now covers 73 countries. The report this year, for the first time, included data on research and development in the United States, making it truly a 'World Survey.' It is the tenth in a series started in 1967. Again this year IRF included indexes of the research projects by 'subject area.' The subject areas are the general categories to which the Highway Research Information Service of the Transportation Research Board assigns individual projects, shown in Figure 1 of Chapter I and identified by the first two digits of the 'HRIS' number accompanying each listed project. This general classification provides a useful guide in the search for projects in broad fields of interest. Two indexes were included: one for overseas reported countries, and one for the United States. (Froehlich-ISWS)
W78-05049

THE IMPACT OF DEVELOPMENT PROJECTS ON ESTUARINE AND OTHER WETLAND ECOSYSTEMS,
Transport and Environment Studies. London (England).
For primary bibliographic entry see Field 6G.
W78-05095

4D. Watershed Protection

EVENT-BASED FORMULATION OF WATERSHED MANAGEMENT,
Arizona Univ., Tucson. School of Renewable Natural Resources.
M. Fogel, L. Duckstein, and A. Musy.
In: Environmental Aspects of Irrigation and Drainage. Proceedings of A Specialty Conference, University of Ottawa, Ontario, July 21-23, 1976. Irrigation and Drainage Division, American Society of Civil Engineers, New York, N. Y., p 349-373, 1976. 8 fig, 41 ref. OWRT B-032-ARIZ(28).

Descriptors: *Watershed management, *Simulation analysis, *Precipitation, *Irrigation, *Scheduling, *Tile drains, *Design, *Stochastic processes, Hydrology, Optimization, Natural resources, Equations, Decision making, Methodology, Seasonal, Rainfall, Flood control, Storm runoff, Sediment yield, Forecasting, Snowmelt, Groundwater recharge, Soil moisture, Mathematical models, Systems analysis, Reservoirs, *Event-based approach, Benefit maximization, Natural uncertainties.

Watershed management relates to a wide range of activities resulting from man's efforts to protect natural resources as well as to use them in production processes. University of Arizona-initiated research on event-based approach is highly versatile, effective in both design and operational phases. Presented is a variety of applications of the methodology. It is shown that the design of floodwater retarding structures and tile drainage systems both require stochastic inputs to determine the most economic design. Similarly, an optimal policy for operating reservoirs and irrigation systems requires that the uncertainties attributed to natural phenomena, model choice, and sample record length all be considered. The methodology is useful primarily for semiarid conditions; it has the advantage of facilitating the use of probabilistic models. It is believed that modeling hydrologic variables on an even basis presents a more realistic interpretation and is more suitable to evaluating man's attempt at modifying the environment of the natural system than the equal-time interval approach is applicable also to humid regions. Most importantly, it lend itself to the management of natural resources for optimal benefit. (Bell-Cornell)
W78-04712

NON-POINT SOURCE POLLUTION SEMINAR, SECTION 108(A) DEMONSTRATION PROJECTS PROGRESS REPORTS, HELD AT CHICAGO, NOVEMBER 20, 1975. POLLUTION CONTROL IN GREAT LAKES.
Environmental Protection Agency, Chicago, IL. Office of the Great Lakes Coordinator.
For primary bibliographic entry see Field 5G.
W78-04719

CONSERVATION FARM PLANNING,
Soil Conservation Service, Fort Wayne, IN.
T. D. McCain.
In: Non-Point Source Pollution Seminar, Section 108 (a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 19-25, 1 tab. EPA G005103, G005139, G005140.

Descriptors: *Planning, *Black Creek Sediment Control Project(IN), *Soil conservation, *Erosion control, *Farm management, Conservation, Decision-making, Indiana, Maumee River Basin, Rotations, Crop production, Farms, Nonpoint pollution, Soil erosion, Agriculture, Cost sharing, Demonstration projects, Universal Soil Loss Equation.

Comprehensive soil conservation planning methodology used for the Black Creek Sediment Control Project, Allen County, Indiana, is discussed. The 12,000-acre Black Creek watershed discharges sediment and nutrients into the Maumee River, a Lake Erie tributary. The five-year project, begun in 1972, was designed to analyze each of 200 farms over five acres and to apply all needed land treatments to reduce erosion and soil loss. Planning goals included: (1) erosion and sedimentation control; (2) balanced crop rotation; (3) planned fertility; (4) manged water disposal; (5) reorganized field layout; (6) improved livestock programs; (7) farm ponds; and (8) improved land value and beauty. Aerial photographs and individualized soil maps provided basic planning data. On each farm soils were classified by degree of hazard. Treatment alternatives for cropland with erosion hazard were formulated through use of the Universal Soil Loss Equation (USLE), A=RKLSCP, which is described in full with examples in this paper. Management and mechanical practices included crop rotation, residue use, minimum tillage, contouring, and strip cropping; mechanical methods included diversion, terracing, and grassed waterways. If landowners were agreeable to the plans presented, a contract was drawn up between the landowner and the Allen County Soil and Water Conservation District, which provided for cost-sharing and technical assistance. (See also W78-04719) (Lynch-Wisconsin)
W78-04723

TILLAGE AND SIMULATED RAINFALL STUDIES,
Purdue Univ., Lafayette, IN. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-04725

USES OF PESTICIDES AND FERTILIZERS IN THE BLACK CREEK WATERSHED,
Purdue Univ., Lafayette, IN. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-04726

SEDIMENT CONTRIBUTIONS TO THE MAUMEE RIVER,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
E. J. Monke, D. B. Beasley, and A. B. Bottcher.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 71-85, 4 fig, 4 tab, 12 ref. EPA G005103, G005139, G005140.

Descriptors: *Black Creek watershed(IN), *Maumee River, *Sediment yield, River basins, Watersheds(Basins), Indiana, Ohio, Agriculture, Sediment control, Black Creek Sediment Control Project(IN), Land use, Discharge(Water), Model studies, Eutrophication, Soil erosion, Lake Erie.

Sediment yields from the Maumee River into Lake Erie, and from the Black Creek watershed in Allen county, Indiana, into the Maumee River are analyzed, and an evaluation is made of factors causing erosion in the watershed. An erosion-sedimentation model is also proposed for relating this process to land use. For a 12-month period in 1974-75 sediment yield from the Black Creek watershed into the Maumee River was 1750 kg/ha, over half of which resulted from one major storm. The primary contributor to erosion in the watershed was the large amount of bare soil exposed to late May and early June storms. Three automated pumping samplers were installed on the large Smith-Fry and Driesbach tributary drains into Black Creek (890 and 735 ha watersheds, respectively), and on Black Creek's main stem near its confluence with the Maumee River. Sediment yield for each drain was 1750 kg/ha during the study period; at the Smith-Fry drain, total precipitation was 1090 mm, with a discharge volume of 350 mm (33% ratio). At the Driesbach drain, precipitation was 1100mm, and discharge was 290mm (26% ratio). The sediment yield from the Maumee River into Lake Erie is estimated at 1,8 million tons annually (about 1000 kg/ha in terms of the basin) which, although not particularly detremental to the agricultural lands, adversely affects water quality in Lake Erie. Phosphorus transported by the colloidal sediments contributes to eutrophication. (See also W78-04719) (Lynch-Wisconsin)
W78-04727

STREAM STABILIZATION,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
R. Z. Wheaton.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 86-92, 2 tab. EPA G005103, G005139, G005140.

Descriptors: *Black Creek watershed(IN), *Stream stabilization, *Stream erosion, *Erosion control, *Slope stabilization, Indiana, Black Creek Sediment Control Project(IN), Streams, Channel erosion, Channel improvement, Sediment control, Vegetation establishment, Mulching, Riprap, Soil conservation, Bank stabilization, Watersheds(Basins).

Four aspects of streambank erosion in the Black Creek watershed in Allen County, Indiana, are under study: (1) streambank stabilization soil

mechanics; (2) effects of streambank slope and mulch on vegetation establishment; (3) structural measures for reduction of stream channel erosion; and (4) naturally-occurring changes in channel cross-section. Soil analyses at five sites in the watershed showed that upland and transition zone channels in the lakebed area, with lower channel gradients and more cohesive soils, are more stable. Stream channels generally were safe from failure by shear at slopes as steep as 1:1. The more cohesive soils were generally found near the surface, and the least cohesive near channel bottoms. Fifty-foot reaches on two channels were reshaped to 2:1, 3:1, and 4:1 slopes, and, after seedijng with Kentucky No. 31 tall fesque, were treated with straw, wood chips, stone, sawdust, Aquatain (a chemical soil stabilizer), or no mulch. All mulches effectively controlled erosion and helped greatly to establish early cover; stone mulch was slightly superior for erosion control. While the 4:1 slope showed no advantages, the 3:1 slope was easier to mow than 2:1. Three structural measures to reduce channel erosion are described: (1) rock-drop structures; (2) a sheet piling weir; and (3) armoring the toe of a slope with small rock. (See also W78-04719) (Lynch-Wisconsin)
W78-04728

SEDIMENT TRAP MEASURING BED LOAD MOVEMENT IN BLACK CREEK,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
R. E. Land, and R. Z. Wheaton.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 93-98, 3 fig, 2 tab. EPA G005103, G005139, G005140.

Descriptors: *Black Creek Sediment Control Project(IN), *Sediments, *Sediment traps, *Bed load, Indiana, Sedimentation, Suspended sediments, Sediment control, Streams, Channels, Particle size, Black Creek(IN).

A flow-through sedimentation trap for particle of high specific gravity was installed in the main stream of Black Creek (Allen County, Indiana) to determine bed-load movement in the channel. This study was part of the Black Creek Sediment Control Project. Work on the basin was completed in September 1974; a cross-sectional survey in July 1975 indicated that 980 cu yds of sediment had been collected. The 400-ft-long basin was situated below the entrance of major Black Creek tributaries and above backwater effects of the Maumee River. The existing channel was widened to 80 ft and deepened to 15 ft, which decreased stream velocity and created plain sedimentation. All particles with a specific gravity over 2.65 and falling rate of 0.0625 ft/sec were probably trapped, as well as, for example, 50% of those with a falling velocity of 0.312 ft/sec. For the July 1975 survey three cross-sections were made in the first 100 ft, and sections were made every 50 ft thereafter. Most of the sediment dropout, and deposition of particles with the highest settling velocity, occurred in the upstream portion of the basin. The sections indicated a meandering stream flow. On several occasions the actual flow far exceeded the design flow, which may have caused a flushing action. Based on the amount of sediment trapped and observation of sand bars downstream from the basin, it was concluded that the bed-load movement in Black Creek is considerable. (See also W78-04719) (Lynch-Wisconsin)
W78-04729

GRASSED WATERWAY DESIGN,
Soil Conservation Service, Kendallville, IN. Area II.
C. F. Poland.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 99-104, 1 fig, 4 ref. EPA G005103, G005139, G005140.

Descriptors: *Grassed waterways, *Runoff, *Erosion control, *Rainfall, Soil conservation, Design, Surface runoff, Vegetation establishment, Tile drainage.

A general description is given of grassed waterways as used for deversion or terrace outlets, disposal of water collected in road ditches or discharged through culverts, and rehabilitation of natural draws carrying runoff. Natural or constructed, they are shaped to required dimensions and vegetated for safe disposal of runoff, and are employed when rainfall exceeds the ability of the soil to absorb or store the moisture. Use of grassed waterways enables removal of surplus water without undue erosion. The following procedures are advised: (1) construction of the water before any other channels that will discharge it; (2) establishment of vegetitive cover by means of mulching, sodding, and irrigation; (3) conveying prolonged flow in a subsurface drainage system; (4) use of stable natural waterways where possible; and (5) maintenance of cover through mowing and fertilization; parabolic design, the shape most often found in nature, is the most satisfactory, although trapezoidal and V-shaped designs are also used. Small flows are least likely to meander in a parabolic waterway. The waterway should be located in a well-vegetated natural draw, which provides the flattest grade, most stable channel, adequate capacity, soil and moisture most favorable to vegetation, and sufficient depth for outletting diversions, terraces, and rows at grade. A tile system providing drainage and protecting the center of the waterway should be included where prolonged low flows or wet conditions prevail. (See also W78-04719) (Lynch-Wisconsin)
W78-04730

NUTRIENT CONTRIBUTIONS TO THE MAUMEE RIVER,
Purdue Univ., Lafayette, IN. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W78-04731

EFFECTS OF LAND TREATMENT ON THE AQUATIC ENVIRONMENT,
Illinois Univ. at Urbana-Champaign. Dept. of Ecology, Ethology, and Evolution.
For primary bibliographic entry see Field 5G.
W78-04732

COMPUTER MONITORING OF ENVIRONMENTAL CONDITIONS IN A WATERSHED,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
L. F. Huggins.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 151-161, 2 fig, 1 tab, 3 ref. EPA G005103, G005139, G005140.

Descriptors: Computers, *Data processing, *Monitoring, *Automation, *ALERT computer system, *Black Creek Sediment Control Project(IN), Indiana, Watersheds(Basins), Data collections, Automatic control, Hydrologic aspects, Meteorological data, Sensors, Environmental control, Microprocessors, Transducers.

General trends in automated environmental data collection are reviewed, and the ALERT system being used for the Black Creek Sediment Control Project (Allen County, Indiana) is described. Field-base instrumentation, based on microprocessors and low-power integrated circuits, and designed to automatically acquire, monitor, and file environmental data, is increasingly replacing traditional systems. The latter utilize sensors connected mechanically or electrically to an individual strip-chart recorder; transcription of analog strip charts into computer-compatible format for analysis and permanent storage is laborious, costly, and error-prone. Automated data acquisition systems can be classified as (1) data logging, or (2) computer controlled. The first type provides periodic scanning of multiple sensors (transducers); resulting data is stored on computer-compatible media and subsequently transported to a remote (off-line) computer for analysis and filing. Prices range from $2,500-10,000. Computer-controlled systems essentially differ in employing a full-scale on-line computer remote to the field transducers to control acquisition, analysis, and filing of the data. ALERT, a computer-controlled system, also includes a data logging component. It was designed to collect hydrometeorological data from the Black Creek catchment as a data base for hydrologic simulation of watershed responses concurrently with naturally occurring storm events. (See also W78-04719) (Lynch-Wisconsin)
W78-04733

PROJECT MANAGEMENT AND LAND TREATMENT COSTS,
Allen County Soil and Water Conservation District, IN.
For primary bibliographic entry see Field 5G.
W78-04734

SYNOPSIS OF THE RED CLAY PROJECT,
Western Lake Superior Basin Erosion and Sediment Control Program, Superior, WI.
S. C. Andrews.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 217-244, 2 fig. EPA G005103, G005139, G005140.

Descriptors: *Erosion control, *Sediment control, *Water quality control, *Red Clay Project(WI MN), *Demonstration projects, Wisconsin, Minnesota, Sedimentation, Lake Superior, Streams, Lakes, Grants, Nonpoint pollution, Suspended solids, Water pollution control.

The Red Clay Project, funded by a research and demonstration grant from EPA to the Soil and Water Conservation Districts of Ashland, Bayfield, Douglas, and Iron Counties in Wisconsin, and Carlton County, Minnesota, was designed to evaluate methods for controlling erosion and sedimentation in streams and lakes on the southern shore of Lake Superior. Sedimentation of lakes and streams was long a concern in this area, but in 1970 the suspended red clay was first identified as a pollutant, and nutrients entering Lake Superior were linked to the area. Several sites were chosen to demonstrate techniques for reducing sedimentation and improving water quality. (1) Skunk Creek, a Nemadji River tributary; application of structural erosion control measures, such as flood-retarding and grade stabilization structures, riprapping of channel banks, and installation of drains on slopes; (2) Little Balsam Creek, also a Nemadji River tributary; application of upland treatment practices, roadside erosion control, and structural control; (3) Pine Creek, a tributary of Fish Creek; applied land treatment and land use management; (4) Ashland shoreline; protective shoreline devices, including riprapping and Longard tubes; and (5) Oronto-Parker watershed; single-purpose sediment basin. A project-related information dissemination and education program is also described, along with institutional and internal management systems, and analysis and evaluation methods. (See also W78-04719) (Lynch-Wisconsin)
W78-04735

BACKGROUND, DEVELOPMENT, AND OBJECTIVES OF THE WASHINGTON COUNTY PROJECT,
Wisconsin Univ.-Madison. Dept. of Soil Sciences.
T. C. Daniel.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports,

Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 245-252, 1 fig, 1 tab, 5 ref. EPA G005103, G005139, G005140.

Descriptors: *Washington County Project(WI), *Water quality control, *Sediment control, *Demonstration projects, *Erosion control, Wisconsin, Grants, Nonpoint pollution, Model studies, Legislation, Regulation, Sedimentation, Watersheds(Basins), Urbanization, Agriculture, Urban runoff, Dairy industry, Menomonee River watershed(WI), Kewaskum watershed(WI), Germantown watershed(WI).

The Washington County Project, in southeastern Wisconsin, was developed in 1973 for the purposes of demonstrating the effectiveness of land treatment measures for reducing nonpoint pollution and improving water quality and devising institutional arrangements for implementation of a sediment control ordinance. Specific objectives include: (1) use of monitoring to demonstrate sediment and erosion control techniques for improving water quality; (2) developing a sediment control ordinance or other management mechanisms acceptable to landowners and government authorities; (3) developing a model for personnel, technical assistance, and financing for implementing a sediment control program; (4) developing a public program of information dissemination; and (5) evaluating the feasibility of sediment and erosion control management programs in the Great Lakes Basin or other areas. Two watersheds in the county were selected to demonstrate water quality improvements from control techniques, Kewaskum, an agricultural area devoted primarily to dairying, and Germantown, a rapidly urbanizing area. To data, project and support staff have been chosen, and monitoring installations at the sites will be in operation by spring of 1976. (See also W78-04719) (Lynch-Wisconsin)
W78-04736

WATER MANAGEMENT REGIONAL PROGRAMS: MORE POTENTIAL THAN SUCCESS,
Delta Coll, University Center, MI. Dept. of Social Science.
For primary bibliographic entry see Field 6B.
W78-04804

THE POTENTIAL WIND EROSION PROBLEM IN THE UNITED STATES,
Soil Conservation Service, Washington, DC. Ecological Sciences and Technology Div.
L. W. Kimberlin, A. L. Hidlebaugh, and A. R. Grunewald.
Transactions of the American Society of Agricultural Engineers, Vol 20, No 5, p 873-879, September-October 1977. 5 fig, 8 tab, 14 ref.

Descriptors: *Wind erosion, *Soil erosion, *Reviews, *Great plains, *United States, Erosion, Soils, Air pollution, Dusts, Damages, Crops, Ranges, Data collections, Soil damage, Soil loss, Crop damage.

Wind erosion is a chronic problem that poses a continuing threat to erodible soils that are exposed through cultivation, overgrazing, construction, or other practices that remove protective cover. In the Great Plains and in other parts of the country, the potential for wind erosion damage can be expected to increase as new lands are brought into cultivation to meet the growing needs for food and fiber. But, since the days of the Dust Bowl, research and technology have provided many tools for dealing with this important problem. During the drought of the past several months, a major portion of the land in the Plains was protected by conservation practices which helped to hold the soil in place and to diminish the adverse effects of the weather. As new lands are brought into production and those presently cropped are subjected to more intensive use, efforts must be accelerated to insure that conservation technology keeps pace with the needs of American agriculture. (Humphreys-ISWS)
W78-04838

A REVIEW OF MULCHES TO CONTROL WIND EROSION,
Agricultural Research Service, Manhattan, KS. North Central Region.
D. V. Armbrust.
Transactions of the American Society of Agricultural Engineers, Vol 20, No 5, p 904-905, 910, September-October 1977. 3 tab, 17 ref.

Descriptors: *Erosion control, *Wind erosion, *Mulching, *Reviews, Erosion, Soil erosion, Soil management, Soil treatment, Soil stabilization, Bituminous material, Emulsions, Farm wastes, Asphalt, *Mulches, Crop residues, Chemical soil stabilizers.

The need to increase food production and to improve the quality of our environment has prompted a search for materials to control wind and water erosion. This paper reviews research and development associated with application, methods, and amounts of mulch types-crop residues, chemical soil stabilizers, and feedlot wastes (manure) -required to control wind erosion. An effective wind erosion control treatment is one that can resist a 38.0 m/s wind as measured at 15.2 m. Any crop residue, either grown in place or hauled in and spread, can control wind erosion. Hauled-in residues must be spread and anchored to the soil surface by a packer or an anchoring agent, i.e., cutback asphalt or asphalt emulsion. Depending on residue type, minimum amounts needed to control wind erosion are 4.5 to 11 t/ha. Chemical soil stabilizers, i.e., asphalt, polyvinyl alcohol, styrene-butadiene latex emulsions, and resins-in-water emulsions control wind erosion effectively if properly diluted and applied to cover the total soil surface at volumes of at least 3785 L/ha. Wet feedlot manure applied to a highly-erodible sand controlled erosion with 31.8 t/ha surface-applied or 52.3 t/ha tilled-in with a tandem disk. (Humphreys-ISWS)
W78-04839

MINIMUM TILLAGE FALLOW SYSTEMS FOR REDUCING WIND EROSION,
Nebraska Univ. Panhandle Station at Scottsbluff.
C. R. Fenster, and G. A. Wicks.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 5, p 906-910, September-October 1977. 2 tab, 15 ref.

Descriptors: *Wind erosion, *Erosion control, *Dry farming, Soil erosion, Fallowing, Land management, Cultivation, Soil management, Soil conservation, Minimum tillage.

Climate is the greatest single factor that influences wind erosion control. Much of the Great Plains has insufficient precipitation for profitable annual cropping under present dryland cropping practices. Moisture conservation and residue maintenance always should be considered when contemplating a tillage operation. The primary purposes of tillage are to control weeds, to reduce erosion, and to prepare a desirable seedbed. The most common type of minimum tillage system in winter wheat production for reducing wind erosion has been stubble-mulch farming. Vegetative cover is required on the soil surface at all times for erosion control. The amount and kind of residue necessary to protect a particular soil fro wid erosion determines the sequence and type of tillage needed. Seeding equipment must place seed firmly into moist soil while maintaining a protective cover of residue on the soil surface. Wind erosion can be controlled by anchoring residues between the rows and maintaining good soil cloddiness and surface roughtness. Minimum tillage systems will aid in residue maintenance, moisture conservation, erosion control, and reducing energy requirements. (Humphreys-ISWS)
W78-04840

REDUCING WIND EROSION WITH BARRIERS,
Agricultural Research Service, Manhattan, KS. North Central Region.
E. L. Skidmore, and L. J. Hagen.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 5, p 911-915, September-October 1977. 5 fig, 1 tab, 39 ref.

Descriptors: *Wind erosion, *Soil erosion, *Erosion control, *Mathematical models, Model studies, Windbreaks, Barriers, Wind velocity, Tractive forces, Shear stress, Theoretical analysis, Analytical techniques, Erosion forces, Soils.

When wind shear forces on the soil surface exceed the soil's resistance to those forces, soil particles detach and are transported by the wind. Barries obstruct the wind and reduce the wind's speed, thus, reducing wind erosion. Application of a model, developed for evaluating effectiveness of a barrier for reducing the capacity of local wind to cause erosion, illustrated: (a) Wind erosion forces are reduced more than windspeed. (b) Properly oriented barriers give much more protection when preponderance is low. (c) When preponderance of wind erosion forces is low, barrier orientation is almost inconsequential. (d) Because of seasonal variation of wind direction and speed, need for and amount of protection also vary seasonally. Many trees, shrubs, tall growing crops, and grasses, and slat-fences all can be used as barriers to reduce wind erosion. (Humphreys-ISWS)
W78-04841

WIND EROSION RESEARCH ACCOMPLISHMENTS AND NEEDS,
Agricultural Research Service, Big Spring, TX.
For primary bibliographic entry see Field 2J.
W78-04842

ANNUAL GRASSES FOR TEMPORARY PROTECTION OF EARTH SPILLWAYS,
Agricultural Research Service, Stillwater, OK.
W. O. Ree, F. R. Crow, and W. W. Huffine.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 5, p 934-939, September-October 1977. 9 fig, 2 tab, 5 ref.

Descriptors: *Oklahoma, *Spillways, *Erosion, Channels, Grasses, Clay, Soils, Hydraulics, Sudangrass, Wheat, Annual, Protection, *Spillway protection, Earth spillways.

Wheat or sudangrass planted on newly graded spillways can provide early protection against erosion from small but frequent storm flows. Within 10 days after seeding on July 1 in Oklahoma, an irrigated sudangrass cover in an earth spillway increases the permissible discharge rate to five times that for an unprotected spillway. Density of a young plant cover should be at least 750 stems/sq m, uniformly distributed over the spillway surface. Irrigation may be needed to bring early emergence of the cover. Wheat seems to offer slightly better protection than sudangrass. However, the cover choice will depend upon the season. In Oklahoma, wheat would be used for winter and sudangrass for the summer. (Lee-ISWS)
W78-04845

SEDIMENT DEPOSITION PATTERNS IN SIMULATED GRASS FILTERS,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
E. W. Tollner, B. J. Barfield, C. Vachirakornwatana, and C. T. Haan.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 5, p 940-944, September-October 1977. 9 fig, 1 tab, 10 ref.

Descriptors: *Deposition(Sediments), *Grasses, *Grassed waterways, *Model studies, Mathematical models, Hydraulic models, Laboratory tests, Filters, Sediments, Sediment transport, Sediment load, Sedimentation.

The principle of mass continuity was used to develop equations to predict the rate of advance of a sediment deposition front in a grass filter under steady-state flow conditions. Based on the theoretical analysis, it was shown that the rate of advance is proportional to the square root of elapsed time until the depth of deposition reaches the grass height and then linearly proportional to elapsed time. The validity of the equations was evaluated in cylindrical and flat bladed artificial media using homogeneous sediment. The agreement between predicted and observed values was excellent. (Sims-ISWS)
W78-04846

A GEOGRAPHICAL APPRAISAL OF THE EXPANSION AND DETERIORATION OF THE INDIAN DESERT,
Central Arid Zone Research Inst., Jodhpur (India).
For primary bibliographic entry see Field 2J.
W78-04932

PROCEEDINGS OF THE 20TH ANNUAL ARIZONA WATERSHED SYMPOSIUM,
Arizona Water Commission, Phoenix.
Report No 8, September 15, 1976, 60 p.

Descriptors: *Arizona, *Water supply, *Water resources, *Water resources development, *Colorado River, *Competing uses, Water demand, Water shortage, Groundwater mining, Groundwater, Fissures(Geologic), Land subsidence, Water levels, Federal project policy, Arid lands, Groundwater availability, Groundwater potential, Federal-State Water Rights Conflicts, *Central Arizona Project, Indian Water Rights, Tucson.

This is a collection of papers and speeches from the Arizona Watershed Symposium held in Phoenix, Arizona. The issues discussed include Arizona's state water plan, groundwater resources, supplies, and problems, groundwater mining and the problem of land subsidence and earth fissures, the role of the forest service in Arizona's water future, the effect of Public Law 92-500 on Arizona's water future, and the Central Arizona Project. The thrust of the conference was that Arizona's future problems revolve around an ever expanding number of water users and water demands and a decreasing water supply. Projections are made about future needs and supplies, and suggestions about water conservation and alternative water sources are discussed. (See W78-04935 thru W78-04941) (Jamail-Arizona)
W78-04934

ARIZONA STATE WATER PLAN--PHASE II,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 6E.
W78-04935

ARIZONA'S GROUNDWATER RESOURCES, SUPPLIES AND PROBLEMS,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 4B.
W78-04936

THE SIGNIFICANCE OF GROUNDWATER LEVEL DECLINES IN EASTERN PIMA COUNTY, ARIZONA,
Tucson Water and Sewers Dept., AZ.
For primary bibliographic entry see Field 4B.
W78-04937

FOREST SERVICE'S ROLE IN ARIZONA'S WATER FUTURE,
Forest Service, Albuquerque, NM.
For primary bibliographic entry see Field 6E.
W78-04938

THE EFFECT OF PUBLIC LAW 92-500 ON ARIZONA'S WATER FUTURE,
Southwest Forest Industries, Phoenix, AZ.
For primary bibliographic entry see Field 5G.
W78-04939

CAP UPDATE,
Bureau of Reclamation, Phoenix, AZ. Arizona Projects Office.
For primary bibliographic entry see Field 4A.
W78-04940

THE CAP IN CONTROVERSY,
Central Arizona Project Association, Phoenix.
For primary bibliographic entry see Field 6E.
W78-04941

HYDROLOGY AND SEDIMENTOLOGY OF THE COLORADO RIVER IN GRAND CANYON,
Arizona Univ., Tucson. Dept. of Ecology and Evolutionary Biology.
For primary bibliographic entry see Field 2J.
W78-05002

ALTERATIONS OF TERRACE DEPOSITS AND BEACHES OF THE COLORADO RIVER IN GRAND CANYON,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 2J.
W78-05004

ORDER CLASSIFICATION OF URBAN CATCHMENTS,
North Carolina Univ. at Raleigh. Water Resources Research Center.
For primary bibliographic entry see Field 2E.
W78-05022

SEDIMENT FROM DRAINAGE SYSTEMS FOR CLAY SOILS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
G. O. Schwab, B. H. Nolte, and R. D. Brehm.
Transactions of the American Society of Agricultural Engineers, Vol 20, No 5, p 866-872, September-October 1977. 3 fig, 2 tab, 10 ref.

Descriptors: *Sediment yield, *Drainage systems, *Ohio, *Clays, Tile drainage, Surface drainage, Soils, Measurements, Testing procedures, On-site tests, On-site investigations, Runoff, Agriculture, Irrigation, Rainfall, Crops, Corn(Field), Oats, Alfalfa, Land management, Cultivated lands, Erosion, Soil loss.

Sediment losses from tile and surface drainage systems in a lakebed soil in northern Ohio were measured for 6 yr (1969-74). Average annual losses were 2359 kg/ha from tile only and 3687 kg/ha for surface only. Calculated losses for the combination tile and surface drainage system were 2672 kg/ha. Annual measured losses ranged from about 100 to 9000 kg/ha. Average net losses from sprinkler irrigation were negligible, and usually more sediment was added than removed in the drainage water. Sediment concentration in tile flow from irrigation increased significantly with the antecedent soil moisture content. Concentrations were high at the beginning of flow but decreased to a nearly constant level after 20 hr. A possible explanation for the high concentrations is that the sediment moved in suspension with the water and not necessarily through the soil cracks. Estimates using a rainfall factor in the universal soil loss equation for surface drainage were 89% of the measured losses with an r sq value of 0.25, significant at the 99% level. Estimates using a runoff factor were 74% of the measured losses with an r sq value of 0.35, also significant at the 99% level. (Humphreys-ISWS)
W78-05030

WIND EROSION: PROCESSES AND EFFECT ON SOIL PRODUCTIVITY,
Agricultural Research Service, Manhattan, KS. North Central Region.
For primary bibliographic entry see Field 2J.
W78-05031

LIME TREATMENT OF DAMS CONSTRUCTED WITH DISPERSIVE CLAY SOILS,
Soil Conservation Service, Grenada, MS.
For primary bibliographic entry see Field 8D.
W78-05035

SEDIMENT YIELD PREDICTION BASED ON WATERSHED HYDROLOGY,
Agricultural Research Service, Temple, TX.
J. R. Williams, and H. D. Berndt.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 6, p 1100-1104, November-December 1977. 3 tab, 12 ref.

Descriptors: *Sediment yield, *Forecasting, *Texas, *Watersheds(Basins), *Mathematical models, Model studies, Runoff, Rainfall-runoff relationships, Water yield, Sediment discharge, Hydrography analysis, Unit hydrographs, Peak discharge, Equations, *Hydrologic models, Soil loss, Daily sediment yield.

Daily, monthly, and annual sediment yield can be predicted fairly accurately by attaching a sediment yield model (MUSLE) to hydrologic models. A water yield model based on SCS curve numbers and a soil moisture index was used to predict daily runoff volumes. The runoff-sediment model was tested on 26 watersheds in Texas. A comparison of measured and predicted average annual sediment yields gave an R sq of 0.98. For eight of the watersheds, monthly measured and predicted sediment had an average R sq of 0.66. Prediction accuracy generally increased with decreasing watershed area, mainly because point rainfall better represents actual rainfall as area decreases. The sediment-runoff model should be useful in reservoir design because long-term average annual sediment yield can be predicted accurately. Since the monthly sediment predictions are fairly accurate and the standard deviations compare closely with measured standard deviations, the model should be useful for other applications, like water quality modeling. The model is practical for most applications because inputs are simple and computer costs are low. (Humphreys-ISWS)
W78-05036

ASSESSMENT OF FLOOD AND EROSION ASSISTANCE PROGRAMS, RONDEAU COASTAL ZONE EXPERIENCE, LAKE ERIE,
Waterloo Univ. (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 4A.
W78-05037

THE ROLE OF VEGETATION IN STABILIZING THE LOWER GREAT LAKES CANADIAN SHORELINE,
Acres Consulting Services Limited, Niagara Falls (Ontario). Environmental Dept.
T. S. Dai, I. K. Hill, and D. W. Smith.
Journal of Great Lakes Research, Vol. 3, No. 1-2, p 46-56, October 1977. 6 fig, 3 tab, 18 ref.

Descriptors: *Shoreline cover, *Vegetation, *Soil stabilization, *Great Lakes, Surveys, Shores, Shore protection, Erosion, Erosion control, Lakes, Waves(Water), Vegetation establishment, Sampling, Data processing, Classification. Shoreline vegetation.

This study examined the natural vegetation of the Canadian shoreline of Lakes Ontario, Erie, and St. Clair. The results suggested that different communities may have different effects on shoreline stability. Classification analyses identified five vegetation communities. The communities were

named for their two leading dominant species. The combined effects of microclimate, soil properties, physiognomic features of the bluffs, and degree of alteration of the shorelines were considered in respect to the vegetation cover, and it was found that no single environmental factor controlled vegetation type. (Sims-ISWS)
W78-05038

PHYSICAL AND CHEMICAL PARAMETERS AFFECTING TRANSPORT OF 137CS IN ARID WATERSHEDS,
Agricultural Research Service, Oxford, MS. Sedimentation Lab.
For primary bibliographic entry see Field 5A.
W78-05042

NON-POINT WATER QUALITY MODELING IN WILDLAND MANAGEMENT: A STATE-OF-THE-ART ASSESSMENT VOL. II: APPENDIXES.
Forest Service (USDA), Washington, DC.
For primary bibliographic entry see Field 5B.
W78-05055

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

WATER QUALITY IN NORTH CAROLINA COASTAL PLAIN STREAMS AND EFFECTS OF CHANNELIZATION,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5B.
W78-04707

EFFECTS OF AN URBAN ROAD SYSTEM ON LEAD CONTENT OF AN URBAN WATER SUPPLY SOURCE,
Massachusetts Univ., Amherst. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04711

THE U.S. GEOLOGICAL SURVEY AND LAND USE MAPPING,
Geological Survey, Reston, VA.
For primary bibliographic entry see Field 7B.
W78-04718

SUMMARY REPORT 1975: FOOD PROTECTION AND TOXICOLOGY CENTER, UNIVERSITY OF CALIFORNIA, DAVIS.
California Univ., Davis. Food protection and Toxicology Center.
For primary bibliographic entry see Field 5C.
W78-04745

WATER POLLUTION INVESTIGATION: CUYAHOGA RIVER AND CLEVELAND AREA,
ECO-LABS, Inc., Cleveland, OH.
For primary bibliographic entry see Field 5B.
W78-04748

FRESHWATER ALGAL VEGETATION IN THE AZORES,
Vaxtbiologiska Institutionen, Uppsala (Sweden).
For primary bibliographic entry see Field 5C.
W78-04752

CLOSTRIDIUM PERFRINGENS AND COLIFORM BACTERIA AS INDICATORS OF FAECAL POLLUTION,
Vattentest A. B., Uppsala (Sweden).
L. Mellgren.
OIKOS Supplementum, Vol. 15, p 195-201, 1973. 4 fig, 1 tab, 8 ref.

Descriptors: *Clostridium perfringens, *Fecal pollution, *Bioindicators, *Coliforms, *Bacteria, Sweden, Water pollution, Sediments, Stockholm Archipelago(Sweden), Waste water, Path of pollutants, Water pollution sources, Pollutants.

In a study of the distribution of domestic wastewater in the Stockholm, Sweden archipelago, the bacterium Clostridium perfringens proved more reliable and accurate an indicator of fecal water pollution than coliform bacteria. C. perfringens is not affected by environmental factors in the same way as coliforms, and the path of polluted water can be followed much further than with the coliforms. Coliform bacteria have several disadvantages as fecal pollution indicators: (1) they may originate in nonfecal sources, such as paper industry wastewater or soil; (2) survival time in water is short due to zooplankton predation, parisitism from other bacteria, bacteriophages, and adverse effects of the water itself; and (3) rapid changes in coliform numbers in sampling bottles necessitate immediate analysis. In contrast, the natural habitat of C. perfringens is the colon of humans and warm-blooded animals, it survives for decades in nature, and it does not appear to multiply in water or at temperatures below 20C. It is an anaerobic sporeforming rod, nonmotile, Gram-positive, and occurring singly, in pairs, or in short chains. In this study water samples at 1-m depths and sediment samples were taken from the Stockholm Archipelago (Sweden) in 1969-71. Maps of fecal pollution were constructed based on coliforms and on C. perfringens. It was found that the area affected by fecal residues can be much more accurately mapped with C. perfringens. The number of C. perfringes in the sediment is a result of sedimenttion over a long period, and therefore indicative of long-term trends. (Lynch-Wisconsin)
W78-04754

WATER QUALITY DATA DURING SEPTEMBER 16-19, 1974 AT SILVER BAY, SAWMILL COVE, AND EASTERN CHANNEL, SITKA, ALASKA.
Environmental Protection Agency, Seattle, WA. Surveillance and Analysis Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 799, Price codes: A05 in paper copy, A01 in microfiche. Working Paper No. E.P.A.-910-8-76-096, May 1975. 72 p, 10 fig, 5 tab, 9 ref, 6 append.

Descriptors: *Water quality standards, *Water pollution control, *Sitka(AK), *Pulp and paper industry, *Estuaries, Waste water disposal, Effluents, Alaska, Silver Bay(AK), Sawmill Cove(AK), Eastern Channel(AK), Marine fisheries, Regulations, Sludge, Sulfite liquors, Dissolved oxygen, Inlets(Waterways), Estuarine environment, Baseline studies.

A water quality survey conducted near Sitka, Alaska in September 1974 showed that many indicators have not improved since installation of a primary wastewater treatment system at the Alaska Lumber and Pulp Company in September 1972. Twenty-two stations in the marine waters of Eastern Channel and the estuarine waters of Silver Bay and Sawmill Cove were sampled for sulfite waste liquor, dissolved oxygen, temperature, pH, and conductivity at depths of 1, 5, 10, and 12 m. Transparency, and chemical, visual, and qualitative biological examination of bottom deposits were assessed near the mill's main sewer. Alaska Water Quality Standards specify that sulfite waste liquor concentrations above 10 mg/l are damaging to some immature shellfish, and above 50 mg/l are toxic to phytoplankton and fish-food organisms. Concentrations of >50 mg/l occurred in 14% of 232 samples taken, and >10 mg/l concentrations occurred in 51% of the samples. At 1 and 5 m depths, 42% of the samples had >50 mg/l concentrations, and 98% >10 mg/l. Of near-surface stations 83% had concentrations >50 mg/l. No major improvement in sulfite waste liquor have occurred since 1968-69. Although improvements in dissolved oxygen have been made since 1972, concentrations continue to fall below the 6.0 mg/l standard during periods of low stream discharge in midsummer and early fall at the 1 m depth. Little improvement was noted in chemical characteristics of sludge deposits in Sawmill Cove and adjacent Silver Bay. (Lynch-Wisconsin)
W78-04756

A MALLOMONAS POPULATION,
Vaxtbiologiska Institutionen, Uppsala (Sweden).
For primary bibliographic entry see Field 5C.
W78-04776

ACTINOTAENIUM COSMARIUM AND STAURODESMUS IN THE PLANKTON OF ROTORUA LAKES,
Vaxbiologiska Institutionen, Uppsala (Sweden).
For primary bibliographic entry see Field 5C.
W78-04777

BIOLOGICAL SURVEY OF PINKHAM CREEK AND THE NORTH PLATTE RIVER IN THE VICINITY OF COWDREY, COLORADO, AUGUST 24, 1972,
Environmental Protection Agency, Denver, CO. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5C.
W78-04781

BACTERIOLOGICAL INVESTIGATIONS OF THE UPPER SOUTH PLATTE RIVER BASIN. MAY 1972, JULY 1972, SEPTEMBER 1972,
Environmental Protection Agency, Denver, CO. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5C.
W78-04782

EFFECTS OF ENVIRONMENTAL CHANGES ON MARSH VEGETATION WITH SPECIAL REFERENCE TO SALINITY,
Tulane Univ., New Orleans, LA.
For primary bibliographic entry see Field 5C.
W78-04785

THE CONTRIBUTION OF AGRICULTURE TO THE EUTROPHICATION OF SWISS WATERS, I. RESULTS OF DIRECT MEASUREMENTS IN THE DRAINAGE AREA OF VARIOUS CHANNELS,
For primary bibliographic entry see Field 5C.
W78-04786

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 3, DETERMINATION OF TOTAL PHOSPHORUS IN NATURAL WATERS,
Uppsala Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 5B.
W78-04790

SYSTEMS FOR RAPID RANKING OF ENVIRONMENTAL POLLUTANTS,
Stanford Research Inst., Menlo Park, CA.
S. Brown, B. R. Holt, and K. E. McCaleb.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 168, Price codes: A12 in paper copy, A01 in microfiche. Final Report CRESS-2, to EPA, August 1975. 294 p, 2 fig, 18 tab, 84 ref, 9 append. 68-01-2940.

Descriptors: *Pollutants, *Ranking, *Priorities, *Systems analysis, *Environmental Protection Agency, EPA, Hazards, Toxins, Scientific and Technical Assessment Reports, STARs, Mathematical models, Pollution abatement, Problem identification and ranking, Planning.

A system for priority ranking of hazardous agents which adversely affect the environment was developed for use by the Office of Research and Development (ORD) of the Environmental Protection Agency (EPA) in preparing a series of Scientific and Technical Assessment Reports (STARs). The STARs summarize the state of knowledge regarding specific hazardous agents, a term interpreted as broader than 'pollutant' and including such entities as chemical pollutants, thermal waste, radiation, and noise. An optimal hybrid ranking system was developed from three possible systems identified by an interdisciplinary team of scientists and analysts. These systems were: (1) expert judgment, (2) an information screening system using indexes, and (3) a mathematical model. A combination of the expert system and a more objective screening/model subsystem was selected. The objective subsystem is designed to support and calibrate the expert system, and consists of an explicit procedure that tests the state of information about an agent, processes available information on the basis of the test results. The expert system would cost about $3,500 per agent, or $120-130,000 annually for 36 agents. The subsystem would cost $50-60,000 per year. The system was tested on ten agents, resulting in the following ranking: cyanides, carbon disulfide, beryllium, lithium, plutonium, antimony, heat from man-made sources, carbonyl sulfide, cobalt, and molybdenum. (Lynch-Wisconsin)
W78-04806

SUBSTANTIVE CORRECTIONS TO SIL COMMUNICATIONS (IVL MITTEILUNGEN) NUMBERS 6 AND 20,
Wisconsin Univ.-Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 2H.
W78-04810

LONG TERM PEACE RIVER CHARACTERISTICS AS A MEASURE OF A PHOSPHATE SLIME SPILL IMPACT,
University of South Florida, Tampa. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04850

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. GREAT LAKES, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04855

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. ATLANTIC COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04856

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. GULF COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04857

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. PACIFIC COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04858

SURFACE-WATER AND GROUND-WATER FEATURES, CLAY COUNTY, FLORIDA,
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-04870

WATER RESOURCES DATA FOR FLORIDA, WATER YEAR 1976--VOLUME 3. SOUTHWEST FLORIDA.
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04871

ANALYSIS OF BOTTOM MATERIAL FROM THE WILLAMETTE RIVER, PORTLAND HARBOR, OREGON,
Geological Survey, Portland, OR. Water Resources Div.
For primary bibliographic entry see Field 2K.
W78-04874

WATER RESOURCES OF THE BARONA, CAPITAN GRANDE, AND SYCUAN INDIAN RESERVATIONS, SAN DIEGO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04876

A NEW METHOD OF MONITORING WATER QUALITY IN A STREAM RECEIVING SEWAGE EFFLUENT, USING CHIRONOMID PUPAL EXUVIAE,
Bristol Univ. (England). Dept. of Zoology.
R. S. Wilson, and J. D. McGill.
Water Research, Vol. 11, p 959-962, 1977. 3 fig, 21 ref.

Descriptors: *Methodology, *Sampling, *Diptera, *Aquatic insects, *Bioindicators, Water quality, Midges, Streams, Systematics, Data collections, Effluents, Sewage effluents, Pollutant identification, *Chironomid pupal exuviae, Species composition, Diversity indices.

It was proposed that the chironomid fauna of a river may be adequately sampled by collecting the floating pupal exuviae which accumulate along the banks and against obstructions. This technique was found to be simple, quick, and applicable to large, deep rivers as well as to small, shallow streams. Such samples provided enough material for examining the percentage composition of species, and for calculating diversity indices. The pupal exuviae were much easier to identify to species or species group than are the larvae. An examination of the effect of a sewage discharge into a small stream in South West England was given as a practical example of the method. (Klein)
W78-04880

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, I. SALINITY VARIATIONS AND ESTIMATION OF RESIDENCE TIME,
Wollongong Univ. (Australia). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04882

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, II. THERMAL BEHAVIOUR,
Wollongon Univ. (Australia). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04883

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, III. DISTRIBUTION OF HEAVY METALS IN SEDIMENTS,
Wollongong Univ. (Australia). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-04884

THE COMMON MUSSEL MYTILUS EDULIS AS AN INDICATOR OF TRACE METALS IN SCANDINAVIAN WATERS. I. ZINC AND CADMIUM,
Uppsala Univ. (Sweden). Inst. of Zoology.
D. J. H. Phillips.
Marine Biology, Vol 43, p 283-291, 1977. 3 fig, 3 tab, 38 ref.

Descriptors: *Bioindicators, *Sampling, *Mussels, *Salinity, Metals, *Zinc, *Cadmium, Shellfish, Invertebrates, Water pollution sources, Water quality, Path of pollutants, *Mollusks, *Scandinavia, *Baltic Sea, Skagerrak, Kattegat.

Concentrations of zinc and cadmium in whole soft parts of mussels, Mytilus edulis (L.), collected from 54 locations in Scandinavian waters were dtermined. Local variations in concentrations of the two metals found in samples taken close to industrial sources of zinc and cadimum confirmed the mussel to act as an accurate indicator of pollution by these metals over the entire range of salinities in which this species can exist. Offshore samples remote from industrial discharges revealed higher concentrations of zinc and cadmium in mussels from low-salinity areas. Major decreases in metal concentrations present in the mussel were apparent in areas of rapid salinity change. Results suggested the existence of a higher biological availability of these metals in regions of low salinity; possible reasons for this were discussed. Data from the present survey were also compared to those reported for mussels taken elsewere. Results revealed the Baltic area to be considerably polluted by trace metals; the waters of Kattegat and Skagerrak were considered to be relatively unpolluted. (Klein)
W78-04890

THE EFFECTS OF FREE CHLORINE AND CHLORAMINE ON GROWTH AND RESPIRATION RATES OF LARVAL LOBSTERS (HOMARUS AMERICANUS),
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 5C.
W78-04892

TOXICITY OF CHLORINE TO JUVENILE SPOT, LEIOSTOMUS XANTHURUS,
Environmental Research Lab., Gulf Breeze, FL.; and Environmental Research Lab., Narragansett, RI.
For primary bibliographic entry see Field 5C.
W78-04895

THE ACUTE TOXICITY OF SIX MONOCYCLIC AROMATIC CRUDE OIL COMPONENTS TO STRIPED BASS (MORONE SAXATILIS) AND BAY SHRIMP (CRAGO FRANCISCORUM),
National Marine Fisheries Service, Tiburon, CA. Tiburon Lab.
For primary bibliographic entry see Field 5C.
W78-04896

GAS-LIQUID CHROMATOGRAPHY DETERMINATION OF RESIDUES OF METHANESULFONATE OF META-AMINOBENZOIC ACID ETHYL ESTER IN FISH,
Fish and Wildlife Service, Warm Springs, GA. Southeastern Fish Control Lab.

J. B. Sills, and G. W. Luhning.
Journal of the Association of Official Analytical Chemists, Vol 60, p 961-962, July 1977. 1 tab, 7 ref.

Descriptors: *Pollutant identification, *Analytical techniques, *Chromatography, *Methodology, *Organic compounds, *Fish, Gas chromatogrphy, Biochemistry, Laboratory tests, Biological properties, Fish physiology, Sulfonates, Tissue analysis, MS-222, *Gas-liquid chromatography, Muscle tissue, Esters.

In this gas-liquid chromatographic procedure for determining residues of methanesulfonate of m-aminobenzoic acid ethyl ester (MS-222) in fish muscle, homogenized tissue was extracted with distilled water, and proteins were removed by coagulation with trichloroacetic acid, centrifugation, and filtration. After careful pH adjustment of the filtrate, MS-222 was partitioned into benzene-ethyl ether and measured by alkali flame ionization gas chromatography. Tissues with known additions of 1-19 microg MS-222/g were analyzed, with recoveries of 84-95%. (Klein)
W78-04899

A COMPARISON BETWEEN VARIOUS CRITERIA FOR THE INTERPRETATION OF BIOLOGICAL DATA IN THE ANALYSIS OF THE QUALITY OF RUNNING WATERS,
Parma Univ. (Italy). Lab. di Ecologia.
P. F. Ghetti, and G. Bonazzi.
Water Research, Vol. 11, p 819-831, 1977. 5 fig, 4 tab, 29 ref.

Descriptors: *Biological communities, Water quality, *Speciation, Indexing, Correlation analysis, Environmental effects, Statistical methods, Ecosystems, Aquatic life, Systematics, Mathematical studies, Model studies, Methodology, Benthos, Invertebrates, *Pollutant identification, Data assessment, Macroinvertebrate communities, Biotic index, Diversity index, Saprobic index, *Torrente Parma(Italy).

Common biological criteria was used for the assessment of water quality to the macroinvertebrate populations in the Torrente Parma (Italy). Data concerning the structure and dynamics of the macroinvertebrate community over one year were analysed through species diversity indices, the saprobic index, and the biotic indices of Woodiviss and Vernesux-Tuffery. The values obtained by applying the various indices were compared. A tentative conversion scale was developed between indices which gave a high degree of correlation. A model representation of the annual species distribution was made using cluster analysis and Fager's affinity index. (Klein)
W78-04901

55FE IN PACIFIC OCEAN PLANKTON,
Oregon Coll. of Education, Monmouth.
For primary bibliographic entry see Field 5B.
W78-04903

VIABILITY OF EMBRYOS OF THE WIN.ER FLOUNDER PSEUDO-PLEURONECTES AMERICANUS EXPOSED TO COMBINATIONS OF CADMIUM AND SALINITY AT SELECTED TEMPERATURES,
Environmental Research Lab., Narragansett, RI.
For primary bibliographic entry see Field 5C.
W78-04908

APPRAISAL OF A REFERENCE TOXICANT FOR ESTIMATING THE QUALITY OF OYSTER LARVAE,
Washington State Dept. of Fisheries, Brinnon. Shellfish Lab.-Point Whitney.
R. D. Cardwell, C. E. Woelke, M. I. Carr, and E. Sanborn.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 6, p. 719-725, 1977. 1 tab, 18 ref.

Descriptors: *Toxicity, *Surfactants, *Larval growth stage, *Growth stages, *Mortality, *Spawning, *Oysters, *Animal metabolism, Animal physiology, Chemical analysis, Bioassay, Detergents, Water pollution effects, Commercial shellfish, *Reference toxicants, DSS, *Dodecy sodium sulfate.

The surfactant dodecyl sodium sulfate (DSS) was evaluated as a reference toxicant. There was a weak relationship between the degree of abnormal development and mortality of a given lot of oyster larvae and its sensitivity to DSS. A significant relationship (P 0. 05) was observed between the time required to induce a given female to spawn and the sensitivity of its progeny to DSS. It was inferred that DSS was not suitable as a reference toxicant. (Katz)
W78-04912

A SURVEY ON THE MERCURY CONTENT OF THE PERSIAN GULF SHRIMP,
Tehran Univ. (Iran). Dept. of Food Hygiene.
V. Parveneh.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 6, p. 778-782, 1977. 9 ref.

Descriptors: *Mercury, Commercial shellfish, *Shrimp, *Toxicity, *Public health, *Heavy metals, Spectrometry, Water pollution effects, Crustacean, Chemical analysis, Bioaccumulation, Tissue analysis, *Methylmercury, *Persian Gulf.

The mercury content of the edible part of the commercially important Persian Gulf Shrimp was analyzed. The level of mercury in the 100 samples examined ranged from 0.08 to 0.88 mg/kg with a mean value of 0.24 mg/kg and a standard deviation of 0.18. These values did not exceed proposed mercury content limit for human consumption. (Katz)
W78-04914

ACCUMULATION OF AROMATIC HYDROCARBONS IN TISSUES OF PETROLEUM-EXPOSED MALLARD DUCKS (ANAS PLATVRHVNCHOS),
New Orleans Univ., LA. Center for Bio-Organic Studies.
For primary bibliographic entry see Field 5C.
W78-04919

ACCUMULATION OF SATURATED HYDROCARBONS IN TISSUES OF PETROLEUM-EXPOSED MALLARD DUCKS (ANAS PLATVRHVNCHOS),
New Orleans Univ., LA. Center for Bio-Organic Studies.
G. C. Lawler, W. Loong, and J. L. Laseter.
Environmental Science and Technology, Vol. 12, No. 1, p 47-51, 1978. 3 fig, 3 tab, 22 ref.

Descriptors: *Oil spills, *Oil pollution, *Animal metabolism, *Mallard duck, *Absorption, *Organic compounds, *Water birds, Gas chromatography, Mass spectrometry, Tissue analysis, *Bioaccumulation, Crude oil, South Louisiana crude.

Mallard drakes were dosed with 5 ml a day of crude oil for 14 days. Tissues from control and experimental ducks were then examined for petroleum hydrocarbons by combined high-resolution gas chromatography and mass spectrometry. Oil was found in every experimental tissue examined but the brain. The skin (an underlying adipose tissue) contained the highest level of saturated petroleum hydrocarbons. The other tissues were ranked relative to the skin as follows: skin > uropygial gland > breast muscle, heart muscle > liver > brain. That saturated petroleum hydrocarbons did not accumulate in duck tissues in the same relative amounts observed in crude oil suggested selective uptake and/or metabolism. (Katz)
W78-04920

EFFECTS OF DDT AND POLYCHLORINATED BIPHENYLS ON CELLULAR METABOLISM AND ULTRASTRUCTURE OF CRITHIDIA FASCICULATA, A FLAGELLATED PROTOZOAN,
Armed Forces Radiobiology Research Inst., Bethesda, MD.
For primary bibliographic entry see Field 5C.
W78-04922

WATER QUALITY AND SOIL PROPERTIES: WATER QUALITY AND ITS EFFECT ON THE PROPERTIES OF LIGHT TEXTURED SOILS,
Rajasthan Coll. of Agriculture, Jaipur (India). Dept. of Soil Science and Agricultural Chemistry.
For primary bibliographic entry see Field 2G.
W78-04930

URBAN RUNOFF QUALITY IN NORTHERN GUAM,
Guam Univ., Agana. Water Resources Research Center.
W. J. Zolan, R. N. Clayshulte, S. J. Winter, J. A. Marsh, and R. H. F. Young.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 564, Price codes: A09 in paper copy, A01 in microfiche. Technical Report No 5, January 1978. 168 p, 101 fig, 32 tab, 14 ref, 2 append. OWRT A-005-GUAM(1). 14-34-0001-6054,7023,7024.

Descriptors: *Storm runoff, *Surface runoff, Water quality, *Storm drains, Cities, Water spreading, Urban runoff, *Water quality standards, *Pollutant identification, Measurement, *Coliform bacteria, *Nitrate-nitrogen, Water pollution sources, *Guam, *Ponding basins, Municipal wastes.

The purpose was to obtain qualitative information on urban runoff in northern Guam. Runoff was collected over an 18 month period from ponding basins and storm drains and analyzed for common water quality parameters. Results indicate that pollutant concentrations in ponding basins are relatively low in comparison to levels measured in other communities in the United States. Moderate to high concentrations of oil and grease and soaps are occasionally measured at storm drain outlets emptying into ponding basins. Coliform bacteria levels are generaly low with geometric means of 900 total coliform per 100 ml and 215 fecal coliform per 100 ml. However, counts range from near zero to several hundred thousand (total coliform) per 100 ml depending on rainfall occurrence and basin sampled. Urban runoff being discharged into coastal waters is generally low in pollutants with the exception of nitrate-nitrogen and coliform bacteria. Counts of bacteria in excess of the Guam Water Quality Standards established for Agana Bay shore waters were observed on most samplings. Groundwater seepage and tap water sources are the suspected source of the high nitrate-nitrogen concentrations (ranging up to 3.4 mg/l) which also exceed Guam Water Quality Standards.
W78-04944

PROCEEDINGS OF CONFERENCE ON ENVIRONMENTAL QUALITY SENSORS (SECOND) HELD AT NATIONAL ENVIRONMENTAL RESEARCH CENTER, LAS VEGAS, NEVADA ON OCTOBER 10-11, 1973.
National Environmental Research Center, Las Vegas, NV.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 570, Price codes: A99 in paper copy, A01 in microfiche. December 1973, 762 p. 253 fig, 26 tab, 211 ref, 6 append.

Descriptors: *Monitoring, *Pollution identification, *Water pollution control, *Remote sensing, *Instrumentation, Data collections, Aerial photography, Satellites, Water pollution, Mapping, Oil

spills, Turbidity, Automatic control, Air pollution, Methodology, Pollutants, Fluorescence, Thermal pollution, *Earth Resources Technology Satellite(ERTS), *Skylab, *Sensors, Multispectral scanners, Lasers.

The Second Conference on Environmental Quality Sensors was held October 10-11, 1973 in Las Vegas, NV, at the National Environmental Research Center (NERC). Attendance was limited to EPA research scientists and Regional Office staff working on research or application aspects of remote sensing. Some 48 papers covered the following broad areas: (1) aerial sensing techniques for water pollution (oil spills, water surface temperature, dissolved oxygen, turbidity, current circulation patterns, acid mine drainage sources, outfalls, thermal pollution, algae, sediment, wastes, and plumes); (2) air pollution monitoring; (3) aerial mapping (thermal, land use, water circulation patterns, pollution effects); (4) regional monitoring systems (St. Louis, Minneapolis-St. Paul, Eastern Europe); (5) automatic on-site monitoring, including Data Collection Platforms (DCPs); (6) remote sensing and data relay using satellites (ERTS, Skylab, GOES, and the National Environmental Monitoring System); (7) remote sensing instrumentation and techniques using aircraft or satellites (multispectral scanners, fluorescence excitation, LIDAR fluorosensors and other laser applications, Zeeman Atomic Absorption Spectrometer, electrochemical sensors/thermal scanners, long path optical measurement, microwave, infrared, ultraviolet, visible spectrum aerial photography, television, false-color imagery); (8) imagery interpretation techniques and keys; and (9) projections of future environmental problems and needs. (See W78-04680 thru W78-04699 and W78-04948 thru W78-04961) (Lynch-Wisconsin)
W78-04947

INTEGRATED REMOTE SENSING SYSTEM,
Environmental Protection Agency, Las Vegas, NV. Monitoring Operations Lab.
L. M. Dunn, and A. E. Pressman.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Sect. I, p 1-31. 8 fig, 4 append.

Descriptors: *Remote sensing, *Aerial photography, *Monitoring, *Pollution identification, Photography, Mapping, Runoff, Oil spills, Infrared radiation, Thermal radiation, Nevada, Data collections, Nonpoint pollution, Multispectral scanners, Thermal mapping.

The National Environmental Research Center in Las Vegas (NERC-Las Vegas) is responsible for developing environmental monitoring techniques and programs for the U.S. Environmental Protection Agency. To carry this out the Monitoring Operations Laboratory, Imagery Acquisition and Interpretation Branch, is developing an integrated system for the collection, processing, interpretation, and reporting of remote sensing data. Five major areas are being addressed: (1) outfall detection, location, and analysis; (2) oil spill damage assessment and documentation; (3) an agricultural chemical runoff model; (4) nonpoint source water pollution monitoring approaches and techniques; and (5) a technical assistance program. Under the latter, the goal of NERC-Las Vegas is to provide annotated data displays, raw data with location indexes, isothermal contour maps, and final interpretation reports for immediate regional needs within 45 days of notification. The data acquisition system is oriented toward remote sensing, especially aerial thermal mapping and multispectral measurements. Using a Monarch B-26 aircraft, IR scanner output is recorded on a 14-tract tape. When high spatial resolution is required, thermal infrared images are recorded on 5-in black and white film from the original 14-track tape. The ground data interception station consists of a 14-tract tape playback recorder, high-speed analog-to-digital converter, computer, 5-inch film recorder, image-enhancement system, scan converter, and 9-track computer-compatible tape recorder. (See also W78-04947) (Lynch-Wisconsin)
W78-04948

EVALUATION OF THE ZEEMAN ATOMIC SPECTROMETER,
National Environmental Research Center, Las Vegas, NV. Monitoring Systems Research and Development Lab.
For primary bibliographic entry see Field 7B.
W78-04949

MULTIWAVELENGTH LIDAR FOR REMOTE SENSING OF CHLOROPHYLL-A IN PHYTOPLANKTON,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
P. B. Mumola, O. Jarrett, Jr., and C. A. Brown, Jr.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Section II, p 1-16. 8 fig.

Descriptors: *Chlorophyll, *Remote sensing, *Fluorescence, *Algae, Phytoplankton, Instrumentation, Virginia, Monitoring, *Pollutant identification, *LIDAR, *Chlorophyll-a, Lasers, James River(VA), York River(VA), Airborne fluorosensing.

NASA Langley Research Center is developing an airborne fluorosensor using multiwavelength laser radar (LIDAR) for detection of chlorophyll-a in living algae where more than one color group may be present. Optical properties of algae and phytoplankton alter the fluorescence excitation and emission spectra of the chlorophyll-a molecule. Over 45 algal species of the four major color groups (blue-green, green, golden-brown, and red) have been analyzed for fluorescence excitation and emission spectra, with Rhodamine B as the fluorescence standard. Excitation spectra differ from one color group to another, each having a unique region for optimum excitation. Spectra within a color group are, however, remarkably similar, and one can therefore characterize fluorescent excitation properties of any algae by its color group. No single excitation wavelength can be chosen to uniformly stimulate chlorophyll-a fluorescence in all algae. The laser used in the system is a four-color dye laser pumped by a single linear xenon flashlamp. Fluorescence is collected by a 25.4-cm-diameter Dall-Kirkham-type telescope, and then passed through a narrow bandpass filter centered at 685 nm (the chlorophyll-a fluorescence peak) and on to the photomultiplier (PMT) tube. The PMT signal is digitized by a waveform digitizer and stored on magnetic tape. Field tests over the York and James rivers (VA) verified this technique. Maximum operational altitude of the present system is about 300 m. (See also W78-04947) (Lynch-Wisconsin)
W78-04950

SUMMARY OF NASA LANGLEY RESEARCH CENTER REMOTE SENSING ACTIVITIES UNDER THE ENVIRONMENTAL PROTECTION AGENCY INTERAGENCY AGREEMENTS: POTENTIAL FOR REGIONAL APPLICATIONS,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
J. L. Raper.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Section II, p 40-68. 20 fig.

Descriptors: *Remote sensing, *Water pollution, Eutrophication, Infrared radiation, Spectrometers, Photography, Aerial photography, *Pollutant identification, Monitoring, Multispectral scanners, Lasers, Radiometers, Earth Resources Technology Satellite(ERTS).

The NASA/EPA Interagency Agreement for Water Pollution Sensor Evaluation (June 1972) specifically mandated investigations of pulsed laser systems, multichannel scanning radiometers, multiband cameras, infrared scanners, and second derivative infrared spectrometers. The NASA Langley Research Center is undertaking investigations in 12 areas to carry out these goals. A 2.65-GHz S-band microwave radiometer which was developed for remote sensing at sea condition, produced as a byproduct data on surface salinity. If the 0.1 K accuracy in brightness temperature is maintained in the L-band system, a variation of 0.2-0.3 ppt of salinity change can be detected over the 3-35 ppt salinity range. A major EPA goal was to develop methods of detecting and monitoring water algae content. A multispectral scanner was used to identify algae and to provide data for a quantitative map of algae content. A C-130 aircraft and 24-channel multispectral scanner were used to gather data in October 1972 over the Patuxent River (MD). The data have not yet been completely analyzed. Earth Resources Technology Satellite (ERTS) imagery data is currently being used in five projects: lake eutrophication, upper bay pollution, land fill classifications, acid mine drainage, and data automation and transmission. Techniques are also being devised for remote sensing of septic tank violation on the South River (MD). (See also W78-04947) (Lynch-Wisconsin)
W78-04951

THE REMOTE DETECTION AND IDENTIFICATION OF SURFACE OIL SPILLS,
Spectrogram Corp., North Haven, CT.
H. R. Gram.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Section VI, p 21-33. 2 fig.

Descriptors: *Oil spills, *Remote sensing, *Fluorescence, Monitoring, Powerplants, Electric powerplants, Instrumentation, Buoys, Water pollution, *Pollutant identification, Barges, Transportation, Fuel oils, Fuel oil No. 6.

Alternative designs considered by an instrument manufacturer commissioned to develop a dockside early warning oil spill detector for an electric power company are described. After evaluating existing analytical methods, the manufacturer developed a device based on fluorescence. The power company desired a buoy-type detector which could be deployed both fore and aft of the large barges in which its oil is delivered. It needed to operate year round day and night, with minimum maintenance under severe weather conditions. Moving parts and contact with the water surface were excluded from consideration. Infrared absorption and reflectance, visible and ultraviolet absorption, chromatography, surface conductivity, and vapor detection were all discarded for various reasons, including interference from surface debris and maintenance problems. Fluorescence or phosphorescence seemed most promising, and laboratory tests for spectral data on undiluted samples were conducted. All oils exhibited overlapping fluorescent signals in the blue region of the visible spectrum when excited by shortwave length ultraviolet radiation. A compromise wavelength was selected for oil was found in the red region, it was decided to include two optical detection channels in the prototype, which was successfully field tested. A land-based console provided through a cable. (See also W78-04947) (Lynch-Wisconsin)
W78-04952

VIDEO DETECTION OF OIL SPILLS,
National Aeronautics and Space Administration, Moffett Field, CA. Ames Research Center.
J. P. Millard, and G. F. Woolever.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Section VI, p 47-64. 9 fig, 1 tab, 14 ref. Coast Guard MIPR Z-70099-2-23146.

Descriptors: *Oil spills, *Remote sensing, Water pollution, *Pollutant identification, California, Aircraft, Oil pollution, Filters, *Television cameras, Santa Barbara Channel(CA).

Three airborne remote sensing systems employing television cameras to detect oil spills being developed by NASA's Ames Research Center, CA, include a conventional TV camera, two cameras operating in a subtractive mode, and a field-sequential camera. The first in a series of test flights conducted over oil platforms in the Santa Barbara Channel (CA) indicates that an appropriately filtered conventional TV camera successfully improves the contrast between oil and water. The camera was mounted in the nose of a Cessna 402 and contained a silicon-dioxide-array image tube and standard glass optics. It was filtered with a polarizer with its principal axis oriented horizontally, and incorporated a Corning 7-54 filter which blocked out visible portions of the spectrum and transmitted the near-UV and optical infrared portions. On the black-and-white monitor image the oil appears bright white against a dark water background. Types of oil and thicknesses to which the system will respond are not presently known. False color enhancement improved the contrast, but problems of sun glint restricted this technique to overcast days. The second system tested, involving two cameras with polarizers rotated at 90 degrees to one another in a subtractive mode, worked well, but the simpler one-camera system was considered preferable. The field sequential system has not yet been tested. (See also W78-04947) (Lynch-Wisconsin)
W78-04953

MEASUREMENTS OF THE DISTRIBUTION AND VOLUME OF SEA-SURFACE OIL SPILLS USING MULTIFREQUENCY MICROWAVE RADIOMETRY,
Hulburt (E.O.) Center for Space Research, Washington, DC. Space Science Div.
J. P. Hollinger, and R. A. Mennella.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Section VI, p 65-74. 5 fig, 1 tab, 8 ref. DOT/USCG 2-21881, Coast Guard Z-70099-2-21881.

Descriptors: *Remote sensing, *Oil spills, *Microwaves, Water pollution, Pollutant identification, Instrumentation, Virginia, Multifrequency passive microwave radiometry.

An Atlantic Ocean test of multifrequency passive microwave radiometry shows that this method offers the potential to measure distribution of marine oil slicks, and to locate thicker regions and measure their thickness and volume. Eight controlled oil spills off the coast of Virginia were measured between August 1971 and August 1972, and were keyed and verified by ground truth data. Oil in two of the spills was dyed with an oil soluble red dye to help establish distribution of the spill. Microwave measurements were taken from a DC-4 aircraft at 19.4 and 69.8 GHz for the first five spills, and at 19.4 and 31.0 GHz for the rest. The latter combination proved more effective for thicker oil concenrtrations. The half-power antenna beam width at all frequencies was 7.2 degrees, yielding a beam spot on the surface of 15 m at the aircraft's operating altitude of 122 m. Slicks always formed an identifiable region containing 90% of the oil, with film thicknesses of 1 mm or more. This region, which occupied less than 10% of the total spill area, was surrounded by a much wider and thinner slick. The thick region could be located and delineated solely by microwave observations. The volume of oil measured by microwave was within 25% of the volume of oil spilled. This detection method works day or night in all weather conditions. (See also W78-04947) (Lynch-Wisconsin)
W78-04954

THE NATIONAL ENVIRONMENTAL MONITORING SYSTEM,
Magnavox Co., Fort Wayne, IN.
T. Major.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Section VI, p 75-109. 26 fig, 3 ref.

Descriptors: *Monitoring, *Satellites, *Automatic control, Environmental effects, Water pollution, United States, Europe, Instrumentation, Pollution abatement, Data collections, Water quality, Meteorological data, Pollutant identification, *Geostationary Operational Environmental Satellite(GOES), *Data Collection Platform(DCP), Japan, Soviet Union, Earth Resources Technology Satellite(ERTS).

Under the National Environmental Monitoring System, the United States will deploy two geostationary operational environmental satellites (GOES) over the western hemishere. Three more of the NASA-developed satellites will be launched by the European Space Research Organization, the Soviet Union, and Japan. The five communications-compatible satellites will form a worldwide monitoring system, relaying data from 40,000 land- and water-based automatic data collection platforms (DCPs) equipped with environmental sensors and radio sets. Digital sensor signals will be transmitted at 100 bits/sec over 150 UHF channels. The first U.S. satellite is set for launch early in 1974. Freshwater hydrological monitoring stations installed in grids across major watersheds will be a principal DCP application. They will measure precipitation, water level, water flow, and water quality. Automatic water quality monitoring stations able to transmit data by way of Earth Resources Technology Satellite (ERTS) are being developed by the National Environmental Research Center in Cincinnati (OH). Water quality monitoing buoys become economically mandatory when synoptic monitoring is required, as manual shipboard monitoring is too costly. Manned and unmanned weather stations are also part of the program design. Extensive diagrams of the program components are also given. (See also W78-04947) (Lynch-Wisconsin)
W78-04955

SKYLAB APPLICATION TO ENVIRONMENTAL MONITORING,
National Aeronautics and Space Administration, Houston, TX. Lyndon B. Johnson Space Center.
V. S. Whitehead.
In: Proceedings of Conference of Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Section VII, p 1-10. 1 fig.

Descriptors: *Remote sensing, *Satellites, *Monitoring, Aerial photography, Spectrometers, Infrared radiation, Geologic investigations, Meteorological data, Mapping, Water pollution, Agriculture, Oceans, Coasts, Pollutant identification, *Skylab, *Earth Resources Experiment Package(EREP), Multispectral scanners.

Skylab, launched May 14, 1973, had on board a cluster of five instruments systems, Earth Resources Experiment Package (EREP), three of which produce data directly applicable to environmental monitoring: (1) a multispectral photographic facility (S190A) with earth terrain camera (S190B); (2) an infrared spectrometer system (S191); and (3) a multispectral scanner (S192). The S190A, which consists of a band of six calibrated bore-slighted 6-in focal length cameras, provides radiometrically and metrically accurate images of ground radiance. The S190B provides high-resolution photography, with ground coverage of 59 n mi square. The infrared spectrometer system quantifies effects of atmospheric attenuation on radiation from surface features over a broad spectral range; the filter wheel spectrometer spectrally scans radiation from 0.4-2.5 micrometers and 6.6-16.0 micrometers. The multispectral scanner records radiance values simulataneously in 13 bands in the visible, near-IR, and thermal IR portions of the spectrum. Limitations of EREP include nadir viewing capability restricted to + or - 50 degrees latitude, gaps between track, only one or two earth-viewing passes per day, and the fact that data is stored with the crew, not telemetered back to earth. The most promisint use of EREP is not detection or tracking of specific contaminants, but rather providing a synoptic perspective on environmental problems. (See also W78-04947) (Lynch-Wisconsin)
W78-04956

ERTS-1 DETECTION OF ACID MINE DRAINAGE SOURCES,
Ambionics Inc., Washington, DC.
E. D. DeGraff, and E. Berard.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Section VII, p 27-36.

Descriptors: *Acid mine water, *Coal mine wastes, *Potomac River, *Remote sensing, Satellites, Aerial photography, Water pollution sources, Water pollution, Pollutants, Maryland, Land use, *Pollutant identification, *Earth Resources Technology Satellite(ERTS), *Upper Potomac River Basin, Multispectral scanners.

Remote sensing imagery by Earth Resources Technology Satellite-1 (ERTS-1) is to be used to locate and monitor sources of acid drainage pollution from the coal fields in the Upper Potomac River Basin. Each image from the ERTS multispectral scanner covers 34,000 sq km; images from four spectral bandwidths ranging from green to near infrared are produced simultaneously. Ground resolution is about 150 ft. In this investigation ERTS images, which have not been received as yet, will be supplemented by data from aircraft and traditional methods, including field-smple data collected gy the Maryland Water Resources Administration Laboratory on pH, total solids, CaCO3, ferrous iron, ferric iron, aluminum, sulfates, and turbidity. Analysis procedure: (1) locate and classify pollution sources on the ERTS imagery using supplementary data; (2) mark topographic changes resulting from surfaces mining on ERTS frames; (3) analyze images over time for texture (degree of coarseness), shapes, and response to varied color bandwidths; (4) relate vegetative cover to topography and drainage basins; (5) analyze ERTS transparencies using I 2S Additive Color Equipment for enhancement of image features; (6) prepare a land-use map, and examine polluted areas for similarities; and (7) use such similarities to identify and investigate new areas which may be polluted. (See also W78-04947) (Lynch-Wisconsin)
W78-04957

WATER QUALITY ANALYSIS USING ERTS-A DATA,
Moore School of Electrical Engineering, Pennsylvania, PA. .
H. Kritikos, L. Yorinks, and H. Smith.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada

on October 10-11, 1973, published December 1973, Section VII, p 37-56. 6 fig, 2 tab, 19 ref.

Descriptors: *Potomac River, *Water quality, *Remote sensing, Satellites, Aerial photography, Earth-water interfaces, Sedimentation, Algae, Chesapeake Bay, Mapping, Tidal effects, Pollutant identification, *ERTS data, Multispectral scanners.

Remote sensing imagery by Earth Resources Technology Satellite-A (ERTS-A) of the Upper Potomac River tidal system, including parts of Chesapeake Bay, was analyzed to determine land-water interfaces and to identify and locate water types according to reflectivity. The images, correlated with ground truth datas, were produced by the ERTS multispectral scanner, which has four spectral bands; transmitted digital data was converted to photographic images before analysis. Of 127 gray levels of the magnetic tapes, only 16 were retained at the photographic level, a serious degradation of the data. Band III (0.7-0.8 micrometers) was useful for determining land-water interfaces, as it gave the greatest contrast between water and its environment. A mask was generated to determine areas covered by water. Band II (0.6-0.7 micrometers) showed maximum brightness spread, with three distinct brightness clusters. These clusters were the basis for identifying three classes of water according to low, medium, and high reflectivity. On computer-generated thematic maps, areas of high sedimentation or algae content were easily determined because of their high reflectivity and consequent brightness. These areas were the Anacostia River and most of the west bank of the Potomac. The most significant observation was that after high tide polutants seemed to accumulate at the west bank of the river. (See also W78-04947) (Lynch-Wisconsin)
W78-04958

SATELLITE STUDIES OF TURBIDITY, WASTE DISPOSAL PLUMES AND POLLUTION-CONCENTRATING WATER BOUNDARIES,
Delaware Univ., Newark. Coll. of Marine Studies.
V. Klemas.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Section VII, p 57-87. 13 fig, 15 ref.

Descriptors: *Remote sensing, *Aerial photography, *Satellites, Turbidity, Waste disposal, Acidic water, Suspended solids, Sediments, Circulation, Tidal effects, Pollutant identification, *Delaware Bay, *ERTS data, Multispectral scanners.

Remote sensing imagery from five orbits of Earth Resources Technology Satellite-1 (ERTS-1) over Delaware Bay in 1972-1973 were interpreted with emphasis on turbidity, off-shore acid disposal plumes, and boundaries between water masses having distinct physical and chemical properties. The four-band multispectral scanner images were produced during different parts of the tidal cycle. The red band (band 5, 0.6-0.7 microns) gave the best contrast for detecting suspended sediment, which acts as a natural tracer for gross current circulation patterns. However, these patterns were delineated by only 3-4 neighboring shades of grey. Color density slicing helped delineate the patterns and differentiate turbidity levels, and negative transparencies gave better contrast when tones fell to within the first few steps of the grey scale. Additive color viewing of the bands did not noticeably improve contrast above that of the best band (band 5). Several distinct water boundaries were noted on band 5 on August 16, 1972. The image of January 25, 1973 disclosed an acid waste plume dumped from a barge 36 mi east of Cape Henlopen; it showed up more strongly in the green band (band 4, 0.5-0.6 microns) than the red band (band 5). Since some acids turn gradually from green to brownish-red after dumping into seawater, the ratio between the two bands may indicate the time elapsed since dumping. (See also W78-04947) (Lynch-Wisconsin)
W78-04959

DATA COLLECTION PLATFORMS FOR ENVIRONMENTAL MONITORING,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
J. E. Painter.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, Published December 1973, Section VII, p. 88-110. 5 fig, 6 tab.

Descriptors: *Monitoring, *Remote sensing, *Satellites, On-site data collections, Automatic control, Delaware River, Massachusetts, Chesapeake Bay, *Data collections, Hydrology, Volcanoes, Pollutant identification, *ERTS data collection platform, *DCP's, Sensors.

The data collection system of the Earth Resources Technology Satellite (ERTS) is the first attempt to establish a large-scale telemetry network using a satellite to relay data from on-site environmental sensors (Data Collection Platforms, or DCP's) to a central collection point. There are currently 125 DCP's in operation in 22 states and 5 foreign countries. Receiving, demodulating, and decoding equipment are located at the Goldstone, (CA) and Goddard data acquisition stations. The automatically controlled DCP's, which have as many as eight sensors, convert analog data to digital form, add a DCP identification number, encode the data, and transmit it to the ERTS. At the ERTS Operations Control Center at Goddard, data is screened for quality and transmitted to users by teletype. One-third of both users and DCP's are accounted for by the U.S. Geological Survey. Hydrology is at present the primary application of data, with volcanology second and water quality third. Each DCP is contacted during 2-7 orbits per day, and 1-4 messages are received by the satellite during each contact period, with an average of 17 good messages per day. Pollution sensors have proven the weakest element in the network, with a high failure rate in experiments to date. Several of these experiments are described in this paper, including projects in the Delaware River Basin, in Massachusetts, and on Chesapeake Bay. (See also W78-04947) (Lynch-Wisconsin)
W78-04960

LIDAR POLARIMETER MEASUREMENTS OF WATER POLLUTION,
Texas A and M Univ., College Station. Remote Sensing Center.
J. W. Rouse, Jr.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, Published December 1973, Section VIII, p. 28-47. 6 fig, 7 ref. DOT-CG-34017-A.

Descriptors: *Remote sensing, *Turbidity, *Oil spills, Instrumentation, Water quality, Water pollution, Pollutant identification, *LIDAR, *Lasers, Backscatter, Polarimeters, Depolarization.

The Lidar Polarimeter, a dual-polarization laser instrument being developed at Texas A and M University, is potentially useful for remote measurements of turbidity and oil on water. The system employs a low-power CW helium-neon 633 nm laser which transmits a narrow beam of polarized, chopped, monochromatic light. A narrow-beam, dual-polarization receiver detects both vertically and horizontally polarized light backscattered from the illuminated target. Measurements of laser light backscattered from non-uniform media confirm the theoretical prediction that depolarization is a subsurface volume-scatter process dependent on the density of suspended particles in the volume. Laboratory and field experiments demonstrated the instruments's capability for measuring turbidity. Tests for detecting oil on water showed that the presence of oil alters the like- and cross-polarized backscatter return, but that oil cannot be uniquely differentiated from characteristics created by certain turbidity conditions. To improve detection reliability, a record-generation Lidar Polarimeter is being constructed for the Coast Guard which employs two lasers, 633 nm and 441.6 nm. The shorter-wavelength source utilizes the increase in refraction index of many types of oil in the blue region. This system has the added advantage of real-time classification of the Lidar Polarimeter signals. (See also W78-04947) (Lynch-Wisconsin)
W78-04961

ANALYSIS OF SOME AQUATIC ENVIRONMENTS OF THE VALLEY OF KATHMANDU DURING THE MONSOON PERIOD: AUGUST-SEPTEMBER, 1971, (IN FRENCH),
Centre Univ. de Savoie, Chambery (France). Lab. de Biologie Vegetale.
For primary bibliographic entry see Field 5G.
W78-04962

SURVEY OF BACTERIA, PHYTOPLANKTON, AND TRACE CHEMISTRY OF THE LOWER COLORADO RIVER AND TRIBUTARIES IN THE GRAND CANYON NATIONAL PARK,
Arizona State Univ., Tempe. Dept. of Botany and Microbiology.
M. R. Sommerfeld, W. M. Crayton, and N. L. Crane.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 731, Price codes: A07 in paper copy, A01 in microfiche. National Park Service, Grand Canyon National Park Report Series, Colorado River Research Program, Technical Report No. 12, July 15, 1976. 136 p, 35 fig, 22 tab, 75 ref.

Descriptors: *Monitoring, *Aquatic microorganisms, *Coliforms, Pathogenic bacteria, Salmonella, Shiggella, Sampling, Chemical analysis, Diatoms, *Phytoplankton, Chlorophyta, Cyanophyta, Pyrrophyta euglenophyta, Boron, Salts, Water quality, Copper, Iron, Calcium, Sodium, ZinC, Trace elements, Manganese, *Colorado River, National Parks, *Arizona, *Grand Canyon National Park, *Pollutant identification.

This baseline research program established aquatic monitoring sites on the Colorado River and its major tributaries in the Grand Canyon National Park and vicinity that could be used for future reference. The investigation revealed total viable bacterial members of 10 to the 2nd power through 10 to the 5th power/ml in the Colorado River and 10 to the 1st power through 10 to the 6th power/ml in the tributaries. The variability in these counts was attributable to sediment load and watershed characteristics. Total coliform bacterial counts exceeded the desirable water quality level at numerous sites. This count raises the possibility of fecal contamination by warm blooded animals and of a potential health hazard. The phytoplankton population was diverse but sparse, particularly downstream from Lee's Ferry. Numbers never exceeded 3000/liter. A total of 122 species were identified in the Colorado River, 137 in the tributaries with 71 being tributary specific. On the basis of numbers, phytoplankton must be considered relatively unproductive in this region. The concentration of 15 chemical elements was monitored, with boron, iron and zinc showing large temporal and spatial variation, and sodium levels increasing from 7-13% downstream. The tributaries differed chemically and showed large variations in boron, calcium, iron, magnesium and manganese relative to flow. Overall, the dissolved chemical quality of the river and tributaries was generally acceptable. (Payton-Arizona)
W78-04999

AQUATIC INVESTIGATION ON THE COLORADO RIVER FROM SEPARATION CANYON TO THE GRAND CLIFFS, GRAND CANYON NATIONAL PARK,
Nevada Univ., Las Vegas. Dept. of Biological Sciences.
J. E. Deacon, and J. R. Baker.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 734, Price codes: A03 in paper copy, A01 in microfiche. National Park Service, Grand Canyon National Park Report Series, Colorado River Research Program Technical Report No. 15, June 1976. 26 p, 10 tab, 14 ref.

Descriptors: Chemical properties, Biological properties, Physical properties, *Water temperature, Water chemistry, Sewage effluents, Density, Euphotic zone, Impaired water quality, Suspension, Water quality, Turbidity, Phytoplankton, *Bacteria, Coliforms, *Colorado River, Productivity, National Park, *Arizona, *Grand Canyon National Park, Lake Mead, *Dissolved oxygen, *Nutrients, Phosphorus.

Physical, chemical, and biological data were collected from two sites between separation rapids and Pierce Ferry in order to examine limnological effects of the Colorado River in relation to Lake Mead. Water temperatures were 2 degrees to 10 degrees cooler than those reported before the closure of Glen Canyon Dam, which may have changed the previous density relationship between Lake Mead and the Colorado River as well as affecting current patterns and limnological conditions in Lake Mead. Dissolved oxygen levels, nutrient concentrations, and bacteria numbers indicate a natural unpolluted state. High phosphorus (greater than 300 ug/l) and coliform concentrations (1160/100 ml) found on January 4, 1976, were an exception, probably due to a large organic discharge into the river. It was suggested that sewage effluent from visitor use has a minimal effect but potential health hazards may exist at some campsites. Primary productivity was found to be variable but generally limited due to concentrations of suspended material. Higher productivity would be undesirable due to the possibility of phytoplankton blooms and increased periphyton growth. (Payton-Arizona)
W78-05000

LIMNOLOGIC STUDIES ON THE COLORADO RIVER FROM LEE'S FERRY TO DIAMOND CREEK,
Arizona State Univ., Tempe. Dept. of Zoology.
G. Cole, and D. Kubly.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 736, Price codes: A05 in paper copy, A01 in microfiche. National Park Service, Grand Canyon National Park Report Series, Colorado River Research Program, Final Report, Technical Report No. 8, June 1976. 88 p, 27 tab, 10 fig, 35 ref.

Descriptors: Running waters, Streams, River systems, *Salinity, Irrigation water, *Suspended solids, Flow control, Alteration of flow, *Colorado River, River regulation, Chemical analysis, *Pollutant identification, Limnology, Hardness(Water), Ionization, Light penetration, Light intensity, Nutrients, Water resources, Planning, Arizona, National Parks, *Grand Canyon National Park, Lee's Ferry, Diamond Creek, Little Colorado River.

The stretch of the Colorado River from Lee's Ferry to mile 225 was found to contain non-potable water due to a high ratio of suspended solids (average 643 ppm) resulting in water too saline to meet present health standards. It is, however, suitable for livestock and industrial usage. A key factor in maintaining this utility is keeping present flow rates or increasing them if possible. Discharge of the Colorado River dilutes the more concentrated streams (such as Kanab Creek and the Little Colorado River), while the flow rate of other tributaries helps dilute the main stream and ameliorate the salt concentration contributed by the more saline tributaries. It is pointed out that gross manipulations of tributary environments should be avoided as they would lead to erosion and a weakening of desired dilution effects by increasing mineral content and aggravating existent salinity problems. (Payton-Arizona)
W78-05003

WATER-QUALITY AND RAINFALL DATA COLLECTED WITH AUTOMATED FIELD STATION, FORT MCCLELLAN, ALABAMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Mobility and Environmental Systems Lab.
M. H. Smith, H. M. Floyd, and H. W. West.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A035 825, Price codes: A03 in paper copy, A01 in microfiche. Report No. Miscellaneous Paper M-76-22, December, 1976. 28 p, 9 fig, 1 tab.

Descriptors: *Pollutant identification, *Water analysis, *Rain gage, Data collections, Water quality, Precipitation, Rain, Rainfall, Analytical techniques, *Water quality sensor, *Rain water analysis.

The system of instruments used to collect water-quality and rainfall data at one site at Fort McClellan, Alabama is briefly described. This work constituted an initial phase in upgrading data acquisition procedures for the long-range environmental program designed to improve management of the installation's natural resources and maintenance of environmental quality. Water quality data include concentration of hydrogen ions (pH), dissolved oxygen, conductivity, water temperature, and transmissivity. Data are presented in tabular form and sample calculations and formulae are given. Pictorial illustrations of the instruments and examples of the data collected from November 12, 1975 through May 27, 1976 are presented. (Seip-IPA)
W78-05010

DETERMINATION OF NITRATE BY ANION EXCHANGE WITH ULTRAVIOLET DETECTION,
Iowa State Univ., Ames. Dept. of Chemistry.
J. G. McComas.
Available from the National Technical Information Service, Springfield, VA 22161 as IS-T-713, Price codes: A03 in paper copy, A01 in microfiche. USERDA Report No. IS-T-713, 1976. 29 p, 7 fig, 2 tab, 21 ref. ERDA W-7405-eng-82.

Descriptors: *Pollutant identification, *Nitrate, *Spectrophotometry, *Anion exchange, *Chromatography, Analytical technique, Water analysis, Water chemistry, Water quality, Water pollution sources, Hydrogen ion concentration, Nitrites, Anion exchange resin, *Silica gel matrix, Anion exchange column, *Ultraviolet absorbance, Silyated silica gel, Spectrophotometric cell, Anion interference, Methemoglobinemia.

An accurate, rapid means of determining nitrate concentration without interruption is essential since nitrate is an indicator of pollution, e.g., from fertilizers, animal wastes or effluents, and is a primary cause of methemoglobinemia as well. A chromatographic method in which a weak base anion exchange resin, synthesized by surface bonding 3-aminopropyltriethoxysilane to silica gel, is used to separate nitrate from interferences has been developed. The nitrate is determined by measuring its absorbance at 220 nm. The detection limit is 0.1 ppm nitrate with a range of 0.1 to 100 ppm nitrate. The relative error and the relative standard deviation is typically less than 2% and 1% respectively. This is due to the high sensitivity of the ultraviolet measurement of 0.061 absorbance unit per part-per-million nitrate. An interference study was performed and no anions commonly found in potable water interfered. A comparison of this method was made with the conventional brucine method on real samples and satisfactory agreement was obtained between the two methods. (Seip-IPA)
W78-05011

MANUAL: RESEARCH AND DEMONSTRATION OF IMPROVED SURFACE MINING TECHNIQUES FOR THE EASTERN KENTUCKY COAL FIELDS.
Kimball (L. Robert) Consulting Engineer, Lexington, KY.
For primary bibliographic entry see Field 5G.
W78-05013

COMPUTER-ASSISTED FURNACE ATOMIC ABSORPTION SPECTROMETRIC ANALYSIS,
Environmental Research Lab.-Duluth, MN.
J. E. Poldoski.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-268 133, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA-600/J-77-010, In: Analytical Chemistry, Vol 49, p 891-893, 1977. 3 fig, 1 tab, 7 ref.

Descriptors: *Pollutant identification, *Computer, Gas, Chromatography, Analytic techniques, *Spectrophotometry, Data processing, Water analysis, Water chemistry, *Trace analysis, Atomic absorption analysis, *Atomic absorption spectrophotometers, Atomization signal, A/D conversion.

The use of furnace atomic absorption instrumentation with a turnkey chromatography data system in water analysis is described. A simple addition of relays to the furnace power supply allows for automatic start-up of A/D conversion and spectrophotometer zeroing at the proper time. Manipulations involving editing, sorting and averaging of up to 250 atomization signals in an analysis run were accomplished by developing a procedure employing BASIC language programming techniques. The same dedicated data system was employed for all steps and post-run data processing, conveniently accomplished in 5-15 minutes, gave a tabulation of sample name, mean concentration, standard deviation, number of analyses, and percent recovery. (Seip-IPA)
W78-05014

LABORATORY MEASUREMENTS OF RADIANCE AND REFLECTANCE SPECTRA OF DILUTE SECONDARY-TREATED SEWAGE SLUDGE,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
W. G. Witte, J. W. Usry, C. H. Whitlock, and E. A. Gurganus.
Available from the National Technical Information Service, Springfield, VA 22161 as NASA TP-1089, Price codes: A02 in paper copy, A01 in microfiche. Report No. NASA TP-1089, December, 1977. 20 p, 6 fig, 3 tab, 10 ref.

Descriptors: *Pollutant identification, *Remote sensing, *Sewage effluents, *Sludge, Waste dumps, Water pollution sources, Water analysis, Waste acid, Analytical techniques, *Ocean waste dumping, *Waste detection, Spectral signature.

A research program was conducted by NASA, in cooperation with EPA and the National Oceanic and Atmospheric Administration (NOAA), to evaluate the feasibility of remotely monitoring ocean dumping of waste products such as acid and sewage sludge. One aspect of the program involves the measurements of upwelled spectral signatures for sewage-sludge mixtures of different concentrations in an 11,600-liter tank; radiance and reflectance spectra in the visible near-infrared ranges for concentrations ranging from 9.7 to 180 ppm of secondary-treated sewage sludge mixed

with two types of base water are given. Results indicate that upwelled radiance varies in a near-linear manner with concentration and that the sludge has a practically flat signal response between 420 and 970 nm. Reflectance spectra were obtained for the sewage-sludge mixtures at all wavelengths and concentrations. (Seip-IPA)
W78-05016

LAND USE CHANGE DETECTION WITH LANDSAT-2 DATA FOR MONITORING AND PREDICTING REGIONAL WATER QUALITY DEGRADATION,
Arkansas Univ., Fayetteville. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W78-05018

THE USE OF MAGNESIUM CARBONATE IN CHLOROPHYLL DETERMINATIONS,
Geological Survey, Atlanta, GA. National Water Quality Lab.
B. W. Lium, and W. T. Shoaf.
Water Resources Bulletin, Vol. 14, No. 1, p 190-194, February 1978. 2 fig, 1 tab, 5 ref.

Descriptors: *Magnesium carbonate, *Chlorophyll, *Water sampling, *Magnesium, Photosynthesis, Analytical techniques, Plant pigments, Algae, Aquatic plants, Phytoplankton, Diatoms, Water analysis, Sampling, Chlorophyta, Plankton, *Sample preservation.

Chlorophyll analyses of both laboratory cultures and natural aquatic samples were unaffeced by the use of magnesium carbonate. Equal volumes of the samples (at various pH values) were pipetted onto 0.45 micrometer filters with and without magnesium carbonate. Chlorophyll concentrations were determined for each filtered sample and for those frozen for specified times. In all samples tested, there was no difference either in the retention of algae or in the stability of chlorophyll over the time period and pH range tested. (Henley-ISWS)
W78-05029

FINE PARTICULATE EMISSIONS DUE TO WIND EROSION,
National Center for Atmospheric Research, Boulder, CO.
For primary bibliographic entry see Field 2J.
W78-05032

PHYSICAL AND CHEMICAL PARAMETERS AFFECTING TRANSPORT OF 137CS IN ARID WATERSHEDS,
Agricultural Research Service, Oxford, MS. Sedimentation Lab.
J. R. McHenry, and J. C. Ritchie.
Water Resources Research, Vol. 13, No. 6, p 923-927, December 1977. 6 tab, 8 ref, 1 append. ERDA AT-(49-7)-3029.

Descriptors: *Radioisotopes, *Cesium, *Soils, *Sediments, Isotope studies, Watersheds(Basins), Erosion, Arid lands, Sediment transport, Reservoirs, Sampling, Data processing, Soil properties, Chemical properties, Physical properties, Sedimentation.

The occurrence and amount of fallout 137Cs were determined in 12 watersheds in the arid southwestern U.S. The factors believed to influence the distribution of 137Cs in the watershed soils and in the reservoir sediments were investigated by using stepwise regression techniques. Seventeen parameters, in the case of soils, and 21 parameters, in the case of sediment, were used in the study. Of the variation in the 137Cs content of soils, 90% per unit weight, could be predicted in terms of the percentage of soil nitrogen, the R factor (rainfall intensity) of the universal soil loss equation, the percentage of sand in the soils, and the soil cation exchange capacity. Also, 90% of the variation in the content of 137Cs in the watershed soils, per unit area, could be predicted in terms of the fallout intensity, the percentages of silt and clay, and the cation exchange capacity. For reservoir sediments, the equivalent predictors of 137Cs accumulation in the sediment profile, per unit weight, were the soil cation exchange capacity, the January-March average precipitation, and the soil contents of total P and N. The distribution of 137Cs in sediments per unit area was predicted similarly by watershed area, percentage of total soil C, reservoir surface area, area concentration of 137Cs in the watershed soils, and soil organic matter. (Sims-ISWS)
W78-05042

BENTHIC INVERTEBRATES AS WATER QUALITY INDICATORS IN THE PENOBSCOT RIVER, MAINE,
Maine Univ. at Orono. Dept. of Entomology.
C. F. Rabeni, and K. E. Gibbs.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 674, Price codes: A05 in paper copy, A01 in microfiche. University of Maine Land and Water Resources Institute, Orono, Completion Report, December 1977. 75 p, 15 fig, 7 tab, 55 ref. OWRT A-028-ME(3), 14-31-0001-5019.

Descriptors: Analysis, Classification, Current velocity, Detritus, Dissolved oxygen, *Invertebrates, Effluents, Rivers, *Sampling, Standing crops, Turbidity, Water chemistry, Water quality, Water temperature, *Maine, *Penobscot River(Maine), *Bioindicators, Pulp wastes, *Pollutant identification, Water pollution sources, *Benthic macroinvertebrate, Bray-Curtis ordination, *Hess sampler, Pollution-stressed/clean water communities, Siltation, Water depth.

This study was designed to develop a system for using benthic macroinvertebrates as water quality indicators in a large deep river. Objectives were: (1) to develop reliable sampling techniques; (2) to determine whether pollution-stressed communities were predictively different from clean water communities; and (3) to determine the range of, and environmental factors responsible for, variations in the structures of clean water communities. Two sampling methods were of value-- (1) a modified Hess sampler which obtained a more representative sample of actual standing crop, and (2) rock-filled baskets secured to the river bottom, which collected a greater number of individuals and taxa. Indicator organisms were not particularly sensitive, and species diversity was often misleading. An efficient water quality classification system was developed using the Bray-Curtis ordination, which was sensitive to changes in the faunal community structure caused by pulp and paper mill effluents. Invertebrates were better indicators of certain types of pollution than were standard physical and chemical methods. Analysis also indicated that the composition of clean water invertebrate communities were partially determined by current velocity, siltation, and organic detritus, and was not affected by water temperature, turbidity, dissolved oxygen, water depth, and water chemistry. Even though there were wide variations in community composition, clean water communities could be distinguished from communities affected by pollution.
W78-05053

RESUSPENSION OF PLUTONIUM FROM CONTAMINATED LAND SURFACES: METEOROLOGICAL FACTORS,
Environmental Monitoring and Support Lab., Las Vegas, NV. Office of Research and Development.
For primary bibliographic entry see Field 5B.
W78-05056

TRACE METALS IN ORGANISMS FROM OCEAN DISPOSAL SITES OF THE MIDDLE EASTERN UNITED STATES,
National Marine Fisheries Service, Milford, CT. Milford Lab.
R. A. Greig, D. R. Wenzloff, A. Adams, B. Nelson, and C. Shelpuk.
Archives of Environmental Contamination and Toxicology, Vol 6, No 4, 1977, p 395-409, 7 tab, 28 ref.

Descriptors: *Environmental effects, *Water pollution, *Disposal, Waste disposal, Sewage disposal, Oceans, Trace elements, Metals, Silver, Cadmium, Manganese, Zinc, Arsenic, Chromium, Mercury, Lead, Fish, Marine fish, Bioaccumulation.

Windowpane flounder and rock crab were collected from disposal sites off New Haven, CN., New York City, and Delaware Bay, and from a control site at Chincoteague Inlet as well as in Long island Sound, Barnegat Bay, and a second area off New York City. No substantial variation in concentration of trace metals was found except that silver was higher in rock crab collected near the New York Bight disposal site; Cd, Mn, and Zn concentrations were greatest in rock crab collected from Long Island Sound. The digestive glands of Long Island Sound. The digestive glands of Long island Sound channeled whelk contained about three times as much Cd and Ag as those from the control site. Channeled whelk were not obtained from the other sites. The data suggests that windowpane flounder and rock crab do not significantly accumulate trace metals to a greater degree than animals obtained from a control site. (Chilton-ORNL)
W78-05059

MERCURY DISPERSAL FROM LODE SOURCES IN THE KUSKOKWIM RIVER DRAINAGE, ALASKA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 5B.
W78-05060

INTERACTIONS BETWEEN ZINC AND SUSPENDED SEDIMENTS IN THE FRASER RIVER ESTUARY, BRITISH COLUMBIA,
British Columbia Univ., Vancouver. Dept. of Geological Sciences.
D. Grieve, and K. Fletcher.
Estuarine and Coastal Marine Science, Vol. 5, No. 3, May 1977, p 415-419, 2 fig, 1 tab, 16 ref.

Descriptors: Geochemistry, *Estuaries, *Sediments, Rivers, Canada, *Zinc, Suspended load, Suspension, Adsorption, Sorption, *Pollutant identification, Desorption, Fraser River estuary(Canada).

Zinc, iron, and manganese concentrations were determined in suspended sediments in water samples collected from a depth of 1 m at eight stations. Range of suspended sediments was from 25 mg/l to 4 mg/l. Changes in concentration of suspended Fe and Mn closely followed variations in suspended sediment load. Increase in dissolved and suspended Zn was found in the mixing zone between fresh and brackish waters. Adsorption and desorption of Zn, together with movement of suspended sediments in the estuary, provided a mechanism for increasing concentration of Zn in estuarine waters compared to those in inflowing water. It was concluded that, depending on the extent of desorption, eventual deposition of suspended sediments will result in the coastal zone acting as a sink for zinc. (Chilton-ORNL)
W78-05061

A 96-HOUR SEDIMENT BIOASSAY OF DULUTH AND SUPERIOR HARBOR BASINS (MINNESOTA) USING HEXAGENIA LIMBATA, ASELLUS COMMUNIS, DAPHNIA MAGNA,

AND PIMEPHALES PROMELAS AS TEST ORGANISMS,
Heidelberg Coll., Tiffin, OH. River Studies Lab.
B. L. Prater, and M. A. Anderson.
Bulletin of Environmental Contamination and Toxicology, Vol. 18, No. 2, August 1977, p 159-169, 2 fig, 6 tab, 5 ref.

Descriptors: Environmental effects, *Water pollution sources, *Bioassay, Chemistry, Minnesota, Toxicology, Mortality, Organic compounds, Pollutant identification, *Sediment bioassay, Synergistic effects, Antagonistic effects.

The stations from which samples were collected were chosen to reflect areas that were suspected to be heavily polluted, moderately polluted, and nonpolluted. A correlation was drawn between the percent mortality of biological test organisms and the bulk sediment chemistry data collected for each station. Biological data and chemical data for each of the eight stations is presented in tabular form. It did not appear that any one parameter was responsible for the mortality of the test organisms. Concentrations varied from one station to another and did not always appear highest at those stations where mortality was greatest. An assumption was made that either a synergistic or antagonistic effect was occurring or that chemical parameters that were not measured (such as organics) were present in high enough concentrations to cause mortality. (Chilton-ORNL)
W78-05066

RELATIVE SENSITIVITY TO LEAD OF A NAKED GREEN FLAGELLATE DUNALIELLA TERTIOLECTA,
Scripps Institution of Oceanography, La Jolla, CA.
For primary bibliographic entry see Field 5C.
W78-05072

AN ECOLOGICAL SURVEY OF THE HEAVY METAL CONTAMINATION OF THE EDIBLE CLAM PAPHIA SP. ON THE IRON-ORE TAILINGS OF TOLO HARBOUR, HONG KONG,
Chinese Univ. of Hong Kong. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-05078

LEAD UPTAKE FROM SEA WATER AND FOOD, AND LEAD LOSS IN THE COMMON MUSSEL MYTILUS EDULIS,
Institut fuer Meeresforschung, Bremerhaven (West Germany).
For primary bibliographic entry see Field 5C.
W78-05083

POLYCHLORINATED BIPHENYLS IN COTTIDS, MUSSELS, AND SEDIMENT IN SOUTHERN PUGET SOUND, WASHINGTON,
Evergreen State Coll., Olympia, WA.
For primary bibliographic entry see Field 5C.
W78-05084

AQUATIC FIELD SURVEYS AT IOWA, RADFORD AND JOLIET ARMY AMMUNITION PLANTS, VOLUME I - IOWA ARMY AMMUNITION PLANT,
Environmental Control Technology Corp., Ann Arbor, MI.
S. L. Sanocki, P. B. Simon, R. L. Weitzel, D. E. Jerger, and J. E. Schenk.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A036 776, Price codes: A18 in paper copy, A01 in microfiche. Final Report to Army Research and Development Command, Washington, D.C. November 1976. 391 p, 107 fig, 115 tab, 45 ref, 20 append. DAMD 17-75-C-5046.

Descriptors: *Iowa Army Ammunition Plant, *Ammunition plants, *Environmental effects, *Industrial wastes, *TNT, *Water pollution sources, *Water pollution effects, Iowa, Effluents, Streams, Brush Creek(IA), Sediments, Sewage disposal, Data collections, Species diversity, Pollutants, Nutrients, Boilers, Aquatic life.

Two field surveys of streams on the grounds of the Iowa Army Ammunition Plant (IAAP) were conducted in June and October 1975 to determine biological and chemical effects to the environment of munitions wastes discharged by the facility. Sampling stations located on Brush Creek and Spring Creek indicated the major pollution sources were boiler blowdown water at 30-70C, discharged into Brush Creek from the power-generating plant, and phosphoric wastes from the sewage treatment plant and several industrial outfalls. Low levels of 2,4,6-trinitrotoluene (TNT), the most important component at the plant, and its transformation products were observed in the water and sediment of Brush Creek at all stations except control station B1. Concentrations were generally highest near the industrial sources, decreasing near the southern IAAP boundary. High concentrations of TNT were found in Brush Creek sediments near the site of an old treatment lagoon, and occurrence of high concentrations in nonflooded soils in the same area suggests that the half-life of polynitro aromatics is much longer under such conditions than in sediments. Dissolved solids were 30% higher in Brush Creek on IAAP grounds than upstream, and phosphorus and nitrate-nigrogen levels were also higher. Minor variations in biological species diversity were noted, corresponding to nutrient and alpha-TNT level fluctuations. (See also W78-05112 and W78-05114) (Lynch-Wisconsin)
W78-05111

AQUATIC FIELD SURVEYS AT IOWA, RADFORD AND JOLIET ARMY AMMUNITION PLANTS, VOLUME II - RADFORD ARMY AMMUNITION PLANT,
Environmental Control Technology Corp., Ann Arbor, MI.
R. L. Weitzel, R. C. Eisenman, and J. E. Schenk.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A036 777, Price codes: A20 in paper copy, A01 in microfiche. Final Report to Army Research and Development Command, Washington, D.C. November 1976. 448 p, 63 fig, 69 tab, 42 ref, 16 append. DAMD 17-75-C-5046.

Descriptors: *Radford Army Ammunition Plant(VA), *Ammunition plants, *Nitroglycerin, *Industrial wastes, *Environmental effects, *Water pollution sources, *Water pollution effects, Aquatic life, Virginia, New River(VA), Effluents, Data collections, Pollutants, Nutrients, Carbon, Species diversity, Rivers.

Sampling of New River, which flows through the Radford Army Ammunition Plant (RAAP) near Radford, Virginia was conducted in May-June and October-November 1975 to measure the biological and chemical impact to the environment of nitroglycerin-production waste discharges. In general, little definitive information was obtained with respect to environmental impact of nitroglycerin production, due to low discharge volume from the facility relative to flow in receiving waters. Insignificant variations in biological community structure were observed; species diversity variations could not be correlated with nitroglycerin effluents. Periphyton production was inhibited near certain outfalls, but a cause-effect relationship was not established. Although water quality of the New River is generally quite good on RAAP grounds, some chemical effects were noted. Concentrations of total organic carbon during the May-June survey were appreciably higher at the sampling station furthest downstream (22 mg/l) than at the upstream control station (4 mg/l). Chromium levels were also higher downstream (0.048 mg/l maximum) than upstream. Nitrogen levels were somewhat higher downstream, but differences were not great (a maximum of 0.34 mg/l). Nitroglycerin was found intermittently in the water column at all stations at concentrations of 0.01-0.02 mg/l, but in few sediment cores. (See also W78-05111 and W78-05114) (Lynch-Wisconsin)
W78-05112

AN INVESTIGATION OF THE NEARSHORE REGION OF LAKE ONTARIO IFYGL.
State Univ. of New York Coll. at Buffalo.
For primary bibliographic entry see Field 5C.
W78-05113

AQUATIC FIELD SURVEYS AT IOWA, RADFORD, AND JOLIET ARMY AMMUNITION PLANTS, VOLUME III - MICROBIOLOGICAL INVESTIGATIONS, IOWA AND JOLIET ARMY AMMUNITIONS PLANTS,
Environmental Control Technology Corp., Ann Arbor, MI.
D. E. Jerger, P. B. Simon, R. L. Weitzel, and J. E. Schenk.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A036 778, Price codes: A08 in paper copy, A01 in microfiche. Technical Publication of Environmental Control Technology Corporation, November 1976. 141 p, 14 fig, 45 tab, 41 ref, 10 append. DAMD 17-75-C-5046.

Descriptors: *Ammunition Plants, *Iowa Army Ammunition Plant, *Joliet Army Ammunition Plant(IL), *Microorganisms, *TNT, *Degradation(Decomposition), Iowa, Illinois, Brush Creek(IA), Grant Creek(IL), Industrial wastes, Effluents, Toxicity, Water pollution sources, Pseudomonas, Benthos, Sediments, Water pollution effects, Path of pollutants.

Aqueous and sediment samples were collected in June and October 1975 from streams at the Iowa Army Ammunition Plant (IAAP) near Burlington, Iowa and at the Joliet Army Ammunition Plant (JAAP), Illinois to investigate effects of microorganisms in determining the fate of TNT in wastewater. Degradation studies with indigenous sediment microbiological populations indicated that the transformation/ degradation of TNT is a cometabolic process requiring an added carbon source. Total mineralization of TNT did not occur, and persistent end-products were found. TNT transformation by microorganisms was fairly rapid and appeared to be concentration-dependent. Acclimated and unacclimated populations from both plants transformed 70-90% of the TNT at concentrations of 10 ppm and 100 ppm in 3-5 days. At 100 ppm an increase in cell density was noted. Anaerobic degradation studies showed that 100 ppm concentrations initially inhibited methane production, but as acclimation progressed, TNT concentrations of >200 ppm were necessary to elicit a toxic respone. It appears that aqueous and sediment microbial communities inherently contain organisms capable of transforming TNT, as extensive acclimation periods were not required. Major transformation products identified differed from those identified by other researchers studying TNT photolysis. (See also W78-05111 and W78-05112) (Lynch-Wisconsin)
W78-05114

REMOTE SENSING ANALYSIS OF LAKE LIVINGSTON AQUATIC PLANTS, 1975 FINAL REPORT,
Texas A and M Univ., College Station. Remote Sensing Center.
A. R. Benton, Jr., and R. M. Newnam.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-31644, Price codes: A03 in paper copy, A01 in microfiche. Report NASA-CR-147975, March 1976. 40 p, 3 fig. NASA NGL 44-001-001.

Descriptors: *Remote sensing, *Lake Livingston(TX), Aquatic weed control, *Water hyacinth, *Eutrophication, *Aerial photography, Trinity River(TX), Brushy Creek(TX), Eichhornia crassipes, Potamogeton, Hydrilla, Coontail, Duckweed, Chemcontrol, Herbicides, 2 4-D, Lakes, Boating, Nutrients.

Aerial infrared color photography monitored the spread of water hyacinth, hydrilla, coontail, duckweed, and potamogeton in Lake Livingston, Texas during 1974-75, and showed results of attempts to control the plants with the herbicide 2,4-D. The newly-formed lake is fed by the nutrient-rich Trinity River. The spread of the plants among lakes has been linked to trailered boats. Winter severity strongly influenced subsequent spring infestations; the mild winter of 1973-74 permitted much of the 1973 water hyacinth crop to winter over, and explosive growth occurred by April 1974. Two hard freezes during the winter of 1974-75 seriously damaged the hyacinth mat, delaying growth until June 1975. Chemical control efforts during 1974 proved inadequate. Localized control in 1975 on White Rock Creek was 100% effective, but in the Jungle and elsewhere on the lake, growth was uninterrupted. The freezes prevented the hyacinth from getting a good start, and domination shifted to submersed plants. A heavy hydrilla infestation occurred in Beacon Bay in 1974, and a lesser infestation was noted in 1975, partially controlled by herbicide treatments. Chemical control experiments conducted on Brushy Creek were also photographed, and a report on those efforts is included. Aerial monitoring of the entire lake shoreline is recommended for 1976. (Lynch-Wisconsin)
W78-05134

THE USE OF MACROINVERTEBRATE BENTHOS IN EVALUATING ENVIRONMENTAL DAMAGE
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
K. W. Cummins.
Available from the National Technical Information Service, Springfield, VA 22161 as CONF-750646-2, Price codes: A02 in paper copy, A01 in microfiche. In: Proceedings of the Workshop on Biological Significance of Environmental Impacts. University of Michigan. 11 p, 2 fig, 1 tab, 23 ref. NSF BMS-74-20746, AT(11-1)-2002.

Descriptors: *Macroinvertebrates, *Benthic fauna, *Bioindicators, *Water quality indicators, *Food habits, *Water pollution effects, Environmental effects, Lotic environment, Ecosystems, Ecology, Watersheds(Basins), Streams, Rivers, Particle size, Organic matter, Insects.

Freshwater benthic macroinvertebrates, especially in running waters, can be divided into four functional groups reflecting their food-gathering habits; changes in the relative dominance of these groups can help indicate environmental damage to the ecosystem. The functional groups, associated with basic organic food sources, are: (1) shredders, which feed on coarse particulate organic matter (CPOM), generally 1-4 mm; (2) collectors, which depend on fine particulate organic matter (FPOM), usually < 1 mm; (3) scrapers (grazers), which graze on attached, growing, and photosynthesized plant tissue (primary production); and (4) predators, which feed on shredders, collectors, and scrapers. These groups, together with microbial processors and producers, are key components of the structure and function of the lotic system. Biomass or biomass turnover of the groups can be related to the ecosystem's capacity to process CPOM and FPOM (detritus) and the products of in-stream photosynthesis. It may be assumed that the functional groups will reflect changes in the relative proportions of the organic budget of the freshwater habitat. It is contended that these groups are better indicators of damage to community structure than typical species lists or diversity indexes. Techniques for separating benthic macroinvertebrates into functional groups is being developed. Thermal regime is probably the best parameter for keying sampling intervals. (Lynch-Wisconsin)
W78-05135

BIOACCUMULATION IN FISH OF CHLORINATED PHENOLS FROM KRAFT PULP MILL BLEACHERY EFFLUENTS,
Swedish Water and Air Pollution Research Lab. Stockholm.
For primary bibliographic entry see Field 5C.
W78-05138

CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT: EFFECT OF MERCURY ON ENCLOSED WATER COLUMNS. I. MANIPULATION OF EXPERIMENTAL ENCLOSURES,
Tsukuba Univ., Ibaraki (Japan). Inst. of Biological Sciences.
M. Takahashi, G. T. Wallace, F. A. Whitney, and D. W. Menzel.
Marine Science Communications, Vol. 3, No. 4, p 291-312, 1977. 4 fig, 3 tab, 12 ref.

Descriptors: *Food chains, *Mercury, *Phytoplankton, *Herbivores, *Carnivores, *Nutrients, *Nutrient requirements, *Heavy metals, *Zooplankton, Ecosystems, Equipment, Chemical analysis, Methodology, *Controlled experimental ecosystem, Saanich Inlet, British Columbia, Canada.

Three enclosures each containing 1300 cubic meters of water were used to study the effect of mercury on mixed trophic levels of pelagic marine organisms in Saanich Inlet, British Columbia, Canada. A summary is given of these containers and of the methods used to maintain and sample the included water and organisms. Background information is provided for succeeding papers. (See also W78-05142 thru W78-05145) (Katz)
W78-05141

CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT: EFFECT OF MERCURY ON ENCLOSED WATER COLUMNS. II. MARINE BACTERIOPLANKTON,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
F. Azam, R. F. Vaccaro, P. A. Gillespie, E. I. Mouzsalli, and R. E. Hodson.
Marine Science Communications, Vol. 3, No. 4, p 313-329, 1977. 6 fig, 10 ref.

Descriptors: *Mercury, *Copper, *Heavy metals, *Marine bacteria, *Plankton, *Toxicity, *Respiration, Biomass, Public health, Radioactivity, Techniques, Ecosystems, Organic compounds, Chemical analysis, *ATP, *Controlled experimental ecosystems, *Methylmercury, *Glucose.

Some effects of low concentrations of added mercury on natural marine bacterioplankton were examined in Controlled Experimental Ecosystems. Heterotrophic activity, measured as D-glucose assimilation and respiration, was initially inhibited, followed by a rapid (5 days) recovery to the 'normal' level. The succeeding bacterial populations showed enhanced mercury tolerance, and were also copper tolerant although no copper additions were made to the enclosures. It is suggested that, whereas decreases in bacterial standing stocks and heterotrophic activity is only transient, the dominance of mercury- and copper- tolerant bacteria in mercury-polluted ecosystems may have implications for the biologically-mediated fate of mercury. (See also W78-05141) (Katz)
W78-05142

CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT: EFFECT OF MERCURY ON ENCLOSED WATER COLUMNS. III. PHYTOPLANKTON POPULATION CYNAMICS AND PRODUCTION,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
W. H. Thomas, D. L. R. Seibert, and M. Takahashi.
Marine Science Communications, Vol. 3, No. 4, p 331-354, 1977. 7 fig, 3 tab, 21 ref.

Descriptors: *Mercury, *Heavy metals, *Phytoplankton, *Zooplankton, *Dinoflagellates, *Diatoms, *Primary productivity, Bioassay, Ecosystems, Radioactivity techniques, Water pollution effects, *Controlled experimental ecosystems, Differential grazing pressure.

The effects of inorganic mercury on natural assemblages of marine phytoplankton were studied under conditions that also included the associated zooplankton assemblages. Following the addition of mercury, there was an initial inhibition of productivity and phytoplankton as compared to a control. After several weeks of exposure bioassays revealed differences in phytoplankton taxa between exposure and control situations. It was concluded that this difference was due to differential grazing pressure. (See also W78-05141) (Katz)
W78-05143

CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT: EFFECT OF MERCURY ON ENCLOSED WATER COLUMNS. IV. ZOOPLANKTON POPULATION DYNAMICS AND PRODUCTION,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
J. R. Beers, M. R. Reeve, and G. D. Grice.
Marine Science Communications, vol. 3, No. 4, p 355-394, 1977. 7 fig, 3 tab, 27 ref.

Descriptors: *Mercury, *Heavy metals, *Toxicity, *Animal metabolism, *Populations, *Zooplankton, *Food chains, *Copepods, *Mortality, *Predation, *Nutrients, Bioassay, Ecosystems, Aquatic environment, *Controlled experimental ecosystem, Zooplankton dynamics, Controlled ecosystem pollution experiment.

The taxonomic composition and abundance of the total zooplankton populations contained in three large-volume enclosures were studied after nominal concentrations of inorganic mercury were introduced into two of the enclosures. A sustained decrease in population size of the copepods Pseudocalanus and Acartia was attributed to the direct effects of mercury. In addition, the alternations in the food chain as a result of this population decrease were discussed. (See also W78-05141) (Katz)
W78-05144

CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT: EFFECT OF MERCURY ON ENCLOSED WATER COLUMNS. V. GROWTH OF JUVENILE CHUM SALMON (ONCORHYNCHUS KETA),
British Columbia Univ. Vancouver. Inst. of Oceanography.
P. A. Koeller, and G. T. Wallace.
Marine Science Communications, Vol 3, No 4, p 395-406, 1977. 2 fig, 3 tab, 11 ref.

Descriptors: *Mercury, *Heavy metals, *Toxicity, *Growth rates, *Growth stages, *Juvenile growth stage, *Fish physiology, *Animal metabolism, *Chum salmon, Ecosystems, Aquatic environment, Bioassay, *Tissue analysis, *Controlled experimental ecosystem, Prey concentrations, British Columbia.

Growth of juvenile chum salmon was examined in three large-volume enclosures. It was apparent that a single dose of 5 micrograms/l-1 had no effect within the 72 day observation period. Low prey concentrations, rather than a direct toxic effect of

added mercury, was the most probable cause of the depressed growth. (See also W78-05141) (Katz)
W78-05145

EVALUATION OF A CELL CULTURE ASSAY FOR DETERMINATION OF WATER QUALITY OF OIL-REFINERY EFFLUENTS,
Oklahoma State Univ., Stillwater. Dept. of Biochemistry; Oklahoma State Univ., Stillwater. Dept. of Statistics; and Oklahoma State Univ., Stillwater. Dept. of Zoology.
D. Richardson.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 6, p 683-690, 1977. 3 fig, 2 tab, 14 ref.

Descriptors: *Toxicity, *Bioassay, *Daphnia, *Cytological studies, *Cultures, *Water quality tandards, *Water quality, *Water analysis, Industrial wastes, *Oil pollution, Bacteria, Effuents, Water pollution effects, Methodology, aboratory tests, *Cell culture assay.

his paper compared Daphnia and cell culture oassays of the toxicity of a reference compound, -cresol, and then applied the procedures to comex fractions derived from oil-refinery effluents. he authors concluded that the cell culture assay as a sensitive, reliable and reproducible method or determination of the toxicity of oil-refinery effluents. (Katz)
W78-05146

CHLORINATED HYDROCARBON RESIDUES IN THE DIET AND EGGS OF THE FLORIDA BROWN PELICAN,
Florida Univ., Gainesville. Pesticide Research Lab.
For primary bibliographic entry see Field 5C.
W78-05147

MINERAL COMPOSITION OF THE SCALES OF CATOSTOMUS COMMERSONI COMING FROM TWO DIFFERENT ENVIRONMENTS: STUDY BY ANALYTIC ELECTRON MICROSCOPY, (IN FRENCH),
Institut National de la Recherche Scientifique, Rimouski (Quebec).
R. Van Coillie, and A. Rousseau.
J Fish Res Board Can. 31(1), p 63-66, 1974.

Descriptors: *Catostomus-commersoni, Circuli, *Electron microscopy, Environment, *Metals, Osteoid, Scales, Spectrometry, Water pollution, X-ray analysis, Mineralogy, *Pollutant identification.

The metal content of scales was studied. Fish of the Catostomus commersoni subspecies were taken from a healthy environment, (the Manicouagan River) and an environment polluted by various metals (Riviere des Prairies, near Montreal). X-ray microspectro-metry was combined with electron microprobe scanning techniques, with subsequent microdensitometric scanning. Scales contained: Ca (predominant), Na, Mg, Al, K, Fe, Cu, Zn, Ba, and some Cr, Mn, Co, Ni, Sr, Ag, Cd, Cs, Hg and Pb. All metals were between the circuli in the osteoid structures. The latter category of metals, widely known for their toxicity, were more abundant in the scales of the sample from polluted waters, whereas the reverse was true for the other metals, with the exception of Al and Ba, which were found in equal quantities in both samples. Since toxic metals are more abundant in polluted waters and excess metal from the water may replace Ca in the scales, it may be inferred that the mineral content of scales is related at least in part to that of the surrounding aquatic environment--Copyright 1975, Biological Abstracts, Inc.
W78-05148

PRELIMINARY BIOCHEMICAL OBSERVATIONS OF FISHES INHABITING AN ACIDIFIED LAKE IN ONTARIO, CANADA,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
W. I. Lockhart, and A. Lutz.
Water, Air and Soil Pollution, Vol. 7, No. 3, p 317-332, 1977. 1 fig, 4 tab, 72 ref.

Descriptors: *Suckers, Freshwater fish, *Lakes, *Acidic water, Fish physiology, *Biochemistry, Catfishes, Bullheads, Calcium, Environmental effects, Fish diseases, Pikes, Perches, Fish populations, Analytical techniques, Canada, Water properties, Trout, Brown trout, Metabolism, *White suckers, *Tissue analysis, Lake George, Lake Manitoba, Catostomus commersoni, Lake Herring.

Blood serum and other tissues of white suckers (Catostomus commersoni) and other species of fish wee examined in a preliminary effort to understand losses of fish from acid lakes. Maturing females of highly acid George Lake failed to show the normal degree of increase in serum Ca over males captured in the same location. Elevated serum Ca was always observed in females, relative to males, from non-acid locations when maturation stages were similar. A number of body tissues were examined to determine whether the distribution of Ca or other elements were altered and the only striking change evident in fish from George Lake was their high Mn content. Bone in particular was examined for N, Na, Mg, P, K, and Ca, and no evidence of demineralization was found. Other tests such as hemoglobin indicated that an anticipated adaptive response to asphyxia was absent. Results indicated that potential mechanisms of fish losses such as asphyxia and starvation were unlikely to have been significant. A working hypothesis was suggested: Ca dynamics may limit ovarian development and absorption of this metal at exchange surfaces may be impaired. (Klein)
W78-05159

STUDIES ON MANGROVE COMMUNITIES IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Dept. of Marine Sciences.
For primary bibliographic entry see Field 5C.
W78-05161

THE ANALYSIS AND CONTROL OF VOLATILE HYDROCARBON CONCENTRATIONS (E.G. BENZENE) DURING OIL BIOASSAYS,
Skidway Inst. of Oceanography, Savannah, GA.
L. P. Atkinson, W. M. Dunstan, and J. G. Natoli.
Water, Air, and Soil Pollution, Vol. 8, No. 2, p 235-242, 1977. 6 fig, 1 tab, 5 ref.

Descriptors: *Pollutant identification, *Phytoplankton, *Bioassay, *Absorption, *Growth rates, *Volatility, *Aromatic compounds, *Analytical techniques, *Laboratory equipment, Gas chromatography, Instrumentation, Organic compounds, Metabolism, Methodology, Oil pollution, *Benzene.

It is well known that volatile hydrocarbons such as benzene, toluene, and xylene, which are abundant in many refined oils, affect phytoplankton growth. However, experiments to determine these effects in many cases have been improperly designed resulting in questionable conclusions. Experiments presented in this paper indicate that ambient benzene concentrations reported in the published literature may be lower than stated by an order of 10 to 100. By continuous monitoring the benzene concentration decrease was observed and it was possible to determine whether the loss was due to degassing because of loose closures or biological uptake. Unless tight closures are used benzene is quickly lost to the atmosphere. Experiments demonstrated that benzene is quickly lost from cotton stoppered bioassay flasks that are typically used. Rubber stoppered flasks with little gaseous headspace showed minimum benzene loss. These experiments indicate that proper closures and analysis of the volatile pollutant concentration during bioassay experiments increase the likelihood of correct interpretation and may yield additional insights into the causation factors. (Deal)
W78-05162

RESPONSE OF SELENASTRUM CAPRICORNUTUM TO ZINC SULFIDES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5C.
W78-05163

BIOMONITORING WITH FISH: AN AID TO INDUSTRIAL EFFLUENT AND SURFACE WATER QUALITY CONTROL,
National Inst. for Water Research Pretoria (South Africa).
W. S. G. Morgan.
Progress in Water Technology, Vol. 9, p. 703-711, 1977. 2 fig, 2 tab, 21 ref.

Descriptors: *Monitoring, *Industrial wastes, Industrial water, *Water quality control, *Public health, Potable water, *Toxicity, *Lethal limit, Fish behavior, Fish physiology, *Bioassay, *Respiration, Methodology, *Bioindicators.

A rapid biological automonitoring system intended to complement physical-chemical monitoring techniques, has been developed which utilize the fact that fish opercular rhythms increase under toxic conditions. Any increase which is above the rate to be expected under normal conditions is monitored electronically. An inbuilt visual alarm system serves as an advance warning of the development of a critical toxic condition. The system also has the ability of controlling toxic industrial discharges, thus aiding the preservation of the quality of receiving waters. (Katz)
W78-05171

MEMBRANE FILTER RETENTION: A SOURCE OF ERROR IN THE 14C METHOD OF MEASURING PRIMARY PRODUCTION,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Environmental Research Branch.
J. W. McMahon.
Limnol Oceanogr. 18(2), p 319-324, 1973.

Descriptors: *Carbon-14 method, Error, *Filters, *Membrane filter retention, Methodology, *Phytoplankton, *Primary production, *Measurement, Pollutant identification.

The relationship between volume of water filtered and apparent specific activity of phytoplankton in which the latter decreases (com 14C ml to the -1 power) with increasing volume filtered, previously attributed to cellular damage to phytoplankton during vacuum filtration, is now considered mainly due to retention of unfixed radiotracer on the membrane filter. The retention capacity for 14C by the filter, expressed as radioactivity per milliliter filtered, is maximum for small sample volumes (less than or equal to 1 ml), decreasing to a constant value when sample volumes are larger than 100ml. This is attributed partially to absorption in the filter and probable retention of 14C bound to unknown substances in the water or on the filter which are eluted or exchanged by passage of volumes of water of 100ml or greater. This 'washing' effect permits almost all of the 14C not fixed in organisms to pass through the filter.--Copyright 1974, Biological Abstracts, Inc.
W78-05172

DRINKING WATER AND HUMAN HEALTH,
National Water Well Association, Worthington, OH.
T. E. Gass.

Water Well Journal, Vol. 32, No. 3, p 38-40, March, 1978. 2 tab, 1 ref.

Descriptors: *Potable water, *Trace elements, *Pollutant identification, Metals, Toxicity, *Water quality standards, Copper, Lead, Chromium, Cadmium, Zinc, Public health.

Large populations are exposed repeatedly, over long periods of time, to minute amounts of potentially toxic contaminants in drinking water. Unfortunately, the methods and criteria of conventional toxicology do not always prove reliable for assessing long-term toxic effects of water constituents, and there is thus great uncertainty in estimating the magnitude of the health risks some contaminants may produce. Trace metals, for example, can occur in water supply sources as a result of both natural processes and man's activities. Elements such as copper, tin, iron, manganese, zinc, chromium, sodium, magnesium, calcium, molybdenum, cobalt, vanadium, and selenium are necessary for human life functions. Adverse health effects associated with trace metals depend upon the total intake from sources such as food and sir, in addition to water. This article presents discussions of five specific trace elements (cadmium, chromium, copper, lead, and zinc), noting conditions for occurence, levels of toxicity, and drinking water standard concentrations for each. (Eberle-NWWA)
W78-05195

5B. Sources Of Pollution

WATER QUALITY IN NORTH CAROLINA COASTAL PLAIN STREAMS AND EFFECTS OF CHANNELIZATION,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
E. J. Kuenzler, P. J. Mulholland, L. A. Ruley, and R. P. Sniffen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 273, Price codes: A09 in paper copy, A01 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Rpt. No 127, 50 fig, 38 tables, 160 pp., October 1977. 88 ref, append. OWRT B-084-NC(2), 14-31-0001-5100.

Descriptors: *Channel improvement, *Water quality, Nutrients, Metals, Dissolved oxygen, *Wetlands, Flood plains, Seasonal flow, *Coastal plains, Farm wastes, Swamps, Water pollution sources, *Channelized streams, Flood plain swamps, *North Carolina, *Swamp streams.

The physical and chemical characteristics of seven small Coastal Plain streams of eastern North Carolina were studied. Three natural streams which flow through relatively undisturbed bottomland hardwood forests were compared to four streams which had been channelized for the purpose of reducing agricultural losses caused by flooding. Two or three sampling stations were established on each stream. Some stations on natural streams were essentially pristine but others received point-source inputs of livestock farm wastes. The natural streams had broad floodplains and low stream velocities even during flood stages. Spates occurred in all seasons, but high discharge, and concomitant flooding of natural swamps, were usually greatest during winter and spring. The waters of channelized streams, however, were restricted: they attained higher velocities, carried greater particulate loads, and were more turbid than natural streams. Some channelized streams were enriched by sewage, by livestock wastes, or by agricultural fertilizer. Weighted mean concentrations of the nutrient element N and P were much lower in waters of unpolluted natural streams than in rainwater, and there was a net input of these nutrients to the watershed. Concentrations and fluxes of elements such as Ca, Mg, Na, K, and Cl, however, were higher in all streams than in precipitation and the net fluxes of these elements were directed out of the watershed. (Kiger-NC State)
W78-04707

INFLUENCE OF ROAD SALTING ON THE NUTRIENT AND HEAVY METAL LEVELS IN STREAM WATER,
New Mexico Univ., Albuquerque. Dept. of Biology.
J. R. Gosz.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 255, Price codes: A03 in paper copy, A01 in microfiche. New Mexico Water Resources Research Institute, Las Cruces, WRRI Report No. 093, February 1978, 40 p, 9 fig, 13 tab, 11 ref. OWRT A-057-NMEX(1), 14-34-0001-7066.

Descriptors: Water quality, Highways, *Snow removal, Salts, *Heavy metals, Roads, *Nutrients, Streams, *Water pollution sources, Soils, Highway effects, Watershed management, Highway icing, New Mexico, *Road salting effects.

The increased use of forested areas for winter recreation in the mountains has resulted in substantial road development and maintenance activities such as road salting. This study evaluated the influence of road salt on levels of nutrients, heavy metals, and sediment in streams as modified by topography. As a result of an extremely low snow pack, salt inputs and stream discharge were low. This reduced losses of nutrients and salt from the below road areas; however, the losses which did occur were strongly linked to the road salting practice. All study areas showed an accumulation of road salt because of the low discharge. The addition of massive quantities of sodium caused the release of other cations and significantly altered soil structure. The breakdown of soil structure appeared to be the major reason for large losses of sediment and heavy metals from the below road areas. Most streams had very low levels of dissolved heavy metal ions. Because of the low snow pack and discharge it was difficult to evaluate a mulching and revegetation treatment. Most of the differences between watersheds seemed a result of topographic features. Steep slopes and a large road area to below road area ratio appear most influential in altering water quality.
W78-04708

WELL INJECTION INTO A TWO-PHASE FLOW FIELD: A HELE-SHAW MODEL INVESTIGATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5E.
W78-04709

EFFECTS OF AN URBAN ROAD SYSTEM ON LEAD CONTENT OF AN URBAN WATER SUPPLY SOURCE,
Massachusetts Univ., Amherst. Dept. of Chemistry.
H. M. Widmer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 193, Price codes: A02 in paper copy, A01 in microfiche. Massachusetts Water Resources Research Center, Amherst, WRRC Publication No 85, Termination Report, September 1976. 18 p, 4 fig, 4 tab, 14 ref. Zajicek, O. T., ed. OWRT A-065-MASS(1).

Descriptors: *Lead, Massachusetts, *Air pollution effects, Water Pollution Sources, Reservoirs, *Dissolved solids, Sediments, *Highway effects, *Path of pollutants, Pollutant identification, Lake sediments, Humic acids, Fulvic substances, *Cambridge Reservoir(Mass).

Water and sediment samples were analyzed to measure the impact of automobile traffic on the lead content of the Cambridge Reservoir. Distance from the road, traffic volume, and water color influence the concentration of dissolved lead. Lead enters the water system in the form of soluble inorganic particulates and is removed by a sedimentation process in which colored natural organic substances, e.g., humic acids, are involved. The average concentration of lead in the upper portion of the Cambridge Reservoir sediment was 2-3 times higher than the reported average lead concentration in the sediment of lakes not exposed to transportation systems. Lead concentrations in sediments decrease with increased distance from the highway. A preliminary model for a sedimentation-solubilizatin process involving humic and fulvic substances is advanced. (Lefferts-Mass)
W78-04711

THE KINETICS OF MINERAL DISSOLUTION IN CARBONATE AQUIFERS AS A TOOL FOR HYDROLOGICAL INVESTIGATIONS, II. HYDROGEOCHEMICAL MODELS,
Tahal-Water Planning for Israel Ltd., Tel Aviv.
For primary bibliographic entry see Field 2F.
W78-04716

NON-POINT SOURCE POLLUTION SEMINAR, SECTION 108(A) DEMONSTRATION PROJECTS PROGRESS REPORTS, HELD AT CHICAGO, NOVEMBER 20, 1975. POLLUTION CONTROL IN GREAT LAKES.
Environmental Protection Agency, Chicago, IL. Office of the Great Lakes Coordinator.
For primary bibliographic entry see Field 5G.
W78-04719

USES OF PESTICIDES AND FERTILIZERS IN THE BLACK CREEK WATERSHED,
Purdue Univ., Lafayette, IN. Dept. of Agronomy.
For primary bibliographic entry see Field 5G.
W78-04726

SEDIMENT CONTRIBUTIONS TO THE MAUMEE RIVER,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-04727

NUTRIENT CONTRIBUTIONS TO THE MAUMEE RIVER,
Purdue Univ., Lafayette, IN. Dept. of Agronomy.
L. E. Sommers, D. W. Nelson, and D. B. Kaminsky, Jr.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 105-119, 1 fig, 7 tab, 6 ref. EPA G005103, G005139, G005140.

Descriptors: *Maumee River, *Black Creek watershed(IN), *Nutrients, *Surface runoff, *Tile drainage, Indiana, Black Creek Sediment Control Project(IN), Runoff, Nitrogen, Phosphorus, Non-point pollution, Fertilizers, Groundwater, Subsurface drainage, Rainfall simulators, Watersheds(Basins).

The nutrient content of surface runoff, tile drain effluents, and surface waters in th Black Creek watershed (Allen County, Indiana) and Maumee River was monitored in 1973-74 as part of the Black Creek Sediment Control Project. Use of a rainfall simulator on four soil types (Haskins loam, Nappanee clay loam, Moreley clay loam, and Hoytville silty clay) which had been recently fertilized indicated an average nutrient loss of 3.5% nitrogen and 3.8% phosphorus in the form of surface runoff. Water samples obtained from 283 tile outfalls in May-June 1974 showed that tile effluents from agricultural land possessed greater concentrations of nitrogen than surface water samples collected near the drainage ditch outlets. Concentrations of total phosphorus were also

higher in the tile effluents than in surface waters, except at one site. Tile effluents and surface runoff are of equal importance as sources of nutrients entering surface waters in the watershed in terms of average concentrations. Stream water samples from 13 Black Creek watershed sites and one Maumee River site showed higher median nitrogen concentrations in the watershed, but higher median phosphorus concentrations in the Maumee River. Rainfall simulation experiments indicated that soil and nutrient losses from these gently sloping soils (0.3-5.2% slope) were low. Rainfall was applied at an intensity of 6.35 cm/hr to the plots, which were fertilized with 56 kg P/ha triple superphosphate and 168 kg N/ha NH4NO3. (See also W78-04719) (Lynch-Wisconsin)
W78-04731

DISTRIBUTION AND ABUNDANCE OF BENTHIC ALGAE ALONG PHOSPHATE GRADIENTS IN KOOTENAY LAKES, BRITISH COLUMBIA,
G. L. Ennis.
Verh. Internat. Verein. Limnol., Vol 19, p 562-570, October 1975. 2 fig, 2 tab, 24 ref. National Research Council 67-3454.

Descriptors: *Kootenay Lake(B.C. Canada), *Algae, *Diatoms, *Eutrophication, *Phosphates, *Benthic flora, British Columbia(Canada), Canada, Nutrients, Mountains, Piedmont, Species diversity, Trophic levels, Fertilizers, Water pollution effect, Lakes, Bioindicators.

Variations in phosphate input to Kootenay Lake, British Columbia, Canada, provided a means of relating benthic algal distribution to nutrient levels. Kootenay is a narrow piedmont lake 105 km long by about 5 km wide, with inlets at both north and south ends and a single outlet at the western midpoint. Since 1953 phosphate fertilizer plant effluent has entered the south end while low amounts of phosphate are added at the north end. Six stations located on the lake's inlets and outlet were sampled between May-September 1973. Diatoms (Chrysophyta, Bacillariophyceae) consistently dominated the epilithic flora, but 137 taxa were identified. Sixteen taxa of Chlorophyta and 14 species of Cyanophyta were commonly observed. Diatoms were 10% more common in the north arm than elsewhere, and were more abundant in the lake in general than in other Canadian lakes. The epilithic algal community was relatively similar to other north temperate lakes, however, with diatoms, chlorophytes, and cyanophytes the only important taxa. The north arm appeared less eutrophic than the south arm, where nutrients such as orthophosphate are higher, and species diversity is lower. Nutrient levels in the west arm were intermediate. The diatom Fragilia construens and green alga Cladophora aegagropila, both eutrophic indicators, were prominent in the south and west arms. (Lynch-Wisconsin)
W78-04737

MODELING OF ACID MINE DRAINAGE AND OTHER POLLUTANTS IN THE MONOGAHELA RIVER BASIN UNDER LOW FLOW CONDITIONS,
West Virginia Univ., Morgantown. Dept. of Civil Engineering.
W. A. Sack, C. R. Jenkins, B. R. Chambers, and R. W. Lange, II.
West Virginia Department of Natural Resources, Charleston, Division of Water Resources, June 1976. 159 p, 79 fig, 20 tab, 15 ref, 1 append.

Descriptors: *Low flow, *Monongahela River Basin(WV), *Acid mine water, *Model studies, QUAL 2 model, Pollutants, Water pollution control, *West Virginia, Point pollution, Mining, Mine drainage, River basin development, River basins, Water pollution sources, ENGRMASS computer program.

Modelling of the West Virginia portion of the Monongahela River Basin at low-flow conditions using EPA's QUAL 2 model and a separate computer program (ENGRMASS) shows that of the four sub-basins modelled, only the Monongahela is appreciably affected by active mines. Abandoned deep mines are the major problem on the other sub-basins--West Fork, Tygart Valley, and Cheat Rivers. Parameters modelled were net acidity, total dissolved solids, dissolved oxygen, and ultimate oxygen demand. Other input data sources included natural stream conditions, municipalities, industries, active and abandoned deep mines, coal refuse piles, and coal preparation plants. Pollutant concentrations were estimated under existing treatment conditions and under 'best practical treatment' (BPT) for population in 1970 and 2000. Application of BPT to active mines in the Monongahela sub-basin would reduce net acidity by 92% at the Pennsylvania border, but the mainstem would still be pH limiting; all tributaries but Deckers Creek would no longer be pH limiting, however. Increased population by the year 2000 will increase alkalinity discharged into the streams. The pH limiting problem on the Tygart River would be reduced to only the RM 67.5 to 50.5 zone. Some improvement to lower Lost Creek would result, but no other improvement would occur on West Fork River. Application of BPT to 48 selected abandoned deep mines in the West Fork and Tygart Rivers would improve the entire Monongahela River mainstem to effluent-limiting conditions. (Lynch-Wisconsin)
W78-04746

WATER POLLUTION INVESTIGATION: CUYAHOGA RIVER AND CLEVELAND AREA,
ECO-LABS, Inc., Cleveland, OH.
E. M. Bently, V. L. Jackson, J. A. Khadye, and A. E. Ramm.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 696, Price codes: A07 in paper copy, A01 in microfiche. Report EPA-905/9-74-012, December 1975. 142 p, 38 fig, 14 tab, 31 ref. 3 append. EPA 68-01-1568.

Descriptors: *Cuyahoga River(OH), *Cleveland(OH), *Water pollution control, *Model studies, *Dissolved oxygen, *Biochemical oxygen demand, Ohio, Rivers, Mathematical models, Computer programs, Lake Erie, Oxygen sag, Effluents, Industrial wastes, Sewage, Waste water treatment, Aquatic life, Stratification, Baseline studies.

Water quality data were collected for the severely-polluted lower Cuyahoga River at Cleveland, Ohio, and a mathematical computer model was developed to simulate biochemical oxygen demand (BOD) and dissolved oxygen (DO) under varying flow conditions. Municipal and industrial treatment programs to be implemented by 1978 will improve dissolved oxygen concentrations, but nonpoint runoff and benthic oxygen demand will continur to cause oxygen sag in the navigation channel during summer low flows, and the lower Cuyahoga will have difficulty supporting all but the most pollution-tolerant aquatic life. Although current DO standards will be met by the anticipated treatment, they are not adequate to protect pollution-sensitive organisms; control of nonpoint pollution sources and additional means of controlling point sources should be emphasized to reduce waste loads. The water quality data were collected in September-October 1973 at five sampling stations in the lower navigational channel. Included were depth; wind speed; water temperature; chemical and biochemical oxygen demand; dissolved, suspended, and total solids; DO; nitrate; conductivity; pH; chloride; and organic and ammonia nitrogen. The DO model consisted of three separate models: (1) one based on Streeter-Phelps equations; 82) a revised and expanded Delaware Estuary finite difference model; and 83) a time-variant model. (Lynch-Wisconsin)
W78-04748

CLOSTRIDIUM PERFRINGENS AND COLIFORM BACTERIA AS INDICATORS OF FAECAL POLLUTION,
Vattentest A. B., Uppsala (Sweden).
For primary bibliographic entry see Field 5A.
W78-04754

WATER QUALITY ASSESSMENT FOR THE PROPOSED RDX-HMX FACILITY, MCALESTER NAVAL AMMUNITION DEPOT, VOLUME I AND II.
Water and Air Research, Inc., Gainesville, FL.
For primary bibliographic entry see Field 5G.
W78-04755

FACTORS AFFECTING TRACE ELEMENT DISPERSION IN LAKE SEDIMENTS IN THE YELLOWKNIFE AREA, N. W. T., CANADA,
R. G. Jackson, and I. Nichol.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol. 19, p 308-316, October 1975. 7 fig, 1 tab, 9 ref.

Descriptors: *Trace elements, *Yellowknife(Northwest Territories Canada), *Lakes, *Sediments, *Distribution patterns, Canada, Dispersion, Canadian Shield, Waves(Water), Dissolved oxygen, Iron, Manganese, Bedrock.

Sediments, bedrock, and soils from 19 lakes in the discontinuous permafrost zone in the Yellowknife area of the Canadian Shield (Northwest Territories, Canada) were analyzed for nine trace elements and organic matter to determine factors affecting their dispersion. The elements were copper, lead, zinc, cobalt, nickel, iron, manganese, silver, and arsenic. Lake water was monitored for temperature, conductivity, dissolved oxygen, and pH. The most important factors influencing the relationship between sediment trace element composition and availability of those elements in surrounding bedrock were: (1) sediment sorting by wave action; (2) iron and manganese coprecipitation of zinc, copper, nickel, silver, and arsenic due to high dissolved oxygen conditions and a pH of 6.8-7.0 in the lake water; and (3) the organic content of the sediment. Sediments containing greater than 15-20% organic matter were associated with the development of hydromorphic geochemical anomalies related to mineralization. Organic sediments of Likely Lake, adjacent to lead-zinc-copper-silver-arsenic mineralization, were uncharacteristically high in lead, copper, and silver; organic sediments of Berry Hill Lake, adjacent to gold-arsenic mineralization, were similarly high in arsenic. At each lake 30-50 sediment samples were collected, and rock and soil samples were obtained from about 15 sites along the shore. Detailed information from nine of the lakes is presented in figures. (Lynch-Wisconsin)
W78-04758

THE DISTRIBUTION OF IRON IN A CLOSED ECOSYSTEM,
T. P. Murphy, and D. R. S. Lean.
Verhandlungen, Internationale Vereinigung Fuer Theoretische und Angewandte Limnologie, Vol 19, p 258-266, October 1975. 8 fig, 20 ref.

Descriptors: *Iron, *Ecosystems, *Phosphorus, *Sediment-water interfaces, *Limnocorrals, *Great Lakes, Distribution, Nutrients, Limiting factors, Chelation, Absorption, Phytoplankton, Periphyton, Chlorophyll, Magnesium, Seston, Canada.

In experiments utilizing closed-ecosystem limnocorrals to study roles of various nutrients and their interrelationships in Great Lakes eutrophication, not significant correlation of iron to trace metals (except magnesium) or phosphorus in the sedimenting material was found. A large amount of iron returning to the open water from the sediments was not available for biological uptake. The

periphyton community where nitrogen fixation occurred contained four times the iron concentration as where nitrogen fixation was low, and nitrogen-fixing phytoplankton had the highest 55Fe uptake. Although a low-molecular-weight substance appeared to have been secreted by the community for iron chelation, most of the iron in the seston was associated with magnesium in a molecular-size range of 1,000-10,000. Average iron sedimentation rates in the corrals were 435 mg/sq m/day (157%) in the nitrogen plus phosphorus corral, 281/sq m/sq m/day (815%) in the phosphorus corral, and 312 mg/sq m/day (141%) in the control. In the top 14 cm of sediment in a corral the amount of iron was 4,502 grams, of which 2.8 grams were in the pore water. (Lynch-Wisconsin)
W78-04762

INTERSTITIAL WATER COMPONENTS AND EXCHANGE ACROSS THE WATER SEDIMENT INTERFACE OF WESTERN LAKE SUPERIOR,
For primary bibliographic entry see Field 5C.
W78-04769

FLUX OF NUTRIENTS BY DIFFUSION THROUGH THE LAKE SEDIMENT-HYPOLIMNION INTERFACE FOR 9 LAKES IN MAINE, U.S.A.,
For primary bibliographic entry see Field 5C.
W78-04770

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970, INTRODUCTION,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 5C.
W78-04787

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 1, OUTFLOW STUDIES,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 5C.
W78-04788

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 2, PHOSPHATE, NITRATE AND AMMONIUM IN THE ARCHIPELAGO DURING 1970,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 5C.
W78-04789

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 3, DETERMINATION OF TOTAL PHOSPHORUS IN NATURAL WATERS,
Uppsala Univ. (Sweden). Dept. of Analytical Chemistry.
L. Gustafsson.
OIKOS Supplementum, Vol. 15, p 171-175, 1973. 2 tab, 5 ref.

Descriptors: *Phosphorus, *Nutrients, *Analytical techniques, Testing procedures, Arsenic, Silicates, Iron, Ions, Methodology, Measurement.

A sensitive and accurate method is described for determining total phosphorus in seawater, brackish water, and freshwater, especially when very low concentrations are present. The influence of silicate, arsenate, and iron ions which may be encountered is investigated, and an arsenic-removal procedure is given. In the absence of interfering arsenic, a summary of the procedure is as follows: (1) mix the water samples; (2) immediately pipette about 50 ml (Containing > 80 micrograms P) into a 100-ml Kjeldahl flask; (3) add 1.2 ml concentrated sulfuric acid; (4) add a few quartz chips and boil down to a small volume (repeat with additional water from the sample if phosphorus contents are low); (5) add 2 ml HNO3(-)HC104 (4+1) and gradually increase the temperature, shaking flask until a ring of condensed H2SO4 reaches a few cm up the flask's neck; (6) continue heating at this temperature 15-25 min; the residual solution should be colorless; (7) cool 5 min, add 10 ml water, carefully rinsing flask walls, and mix immediately; (8) heat to near boiling 10-15 min; (9) add 10-15 ml water and filter immediately; (10) wash flask and filter paper with sulfuric acid; (11) add 5 ml of 2.5% ammonium molybdate and 2 ml of 10% ascorbic acid; (12) maintain at 40C for 90 min, and measure absorbance at 830 nm in a 10 cm cell. Calibration is described. (Lynch-Wisconsin)
W78-04790

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 4, PHYTOPLANKTON DISTRIBUTION IN THE ARCHIPELAGO MEASURED AS CHLOROPHYLL A,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
G. Engstrom.
OIKOS Supplementum, Vol. 15, p 176-178, 1973. 4 fig, 3 ref.

Descriptors: *Phytoplankton, *Stockholm Archipelago(Sweden), *Chlorophyll, *Eutrophication, *Algae, Distribution patterns, Lake Malaren(Sweden), Sewage disposal, Nutrients, Diatoms, Diatoma elongatum, Thalassiosira baltica, Oscillatoria agardhii, Standing crops, Baltic Sea.

Surface water samples taken from the Stockholm Archipelago, Sweden, in 1969-70 were analyzed for chlorophyll-a to measure phytoplankton standing crop. The archipelago, on the Baltic Sea, is overloaded with nutrients received from Lake Malaren, into which Stockholm discharges its sewage. Early in 1971 biological and chemical sewage treatment was initiated. Within 20 km of Stockholm in the archipelago, Melosira spp filaments were dominant. In the center of the archipelago, 40-50 km east of Stockholm, a heavy Diatoma elongatum growth dominated in May. Further out, other diatoms were found, including Achnanthes taeniata, Chaetoceros spp, Sceletonema costatum, and Thalassiosira baltica, as well as the Dinophyceae Gonyaulax catenata. With the June closing of Lake Malaren's outlet, the Norrstrom River, Oscillatoria agardhii dominated until the end of October. At the end of June, however, high cholorphyll values near Stockholm were due to the chlorophytes Selenastrum spp, Scenedesmus spp, Dictyosphaerium pulchellum, and Pandorina morum; in August, September, and October chlorophyll values decreased in this area. After mid-October chlorophyll values over 10 micrograms/l were found only in the central archipelago, where a bloom of the diatom Thalassiosira baltica occurred. (Lynch-Wisconsin)
W78-04791

ORGANIC CARBON AND DEOXYGENATION IN THE PAMLICO RIVER ESTUARY,
East Carolina Univ., Greenville, SC. Dept. of Biology.
G. J. Davis, M. M. Brinson, and W. A. Burke.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 311, Price codes: A07 in paper copy, A01 in microfiche. North Carolina Water Resources Research Institute, Raleigh, Report No 131, (UNC-WRRI-78-131), January 1978. 123 p, 55 fig, 12 tab, 77 ref, 2 append. OWRT A-088-NC(2). 14-34-0001-7070.

Descriptors: *Carbon, *Carbon cycle, *Deoxygenation, *Estuaries, North Carolina, Dissolved solids, *Organic carbon, *Path of pollutants, Distribution, Water pollution sources, Nitrogen, Nitrates, *Phytoplankton productivity, *Dissolved organic carbon, *Pamlico River Estuary(NC).

The distribution, sources and sinks of organic carbon were studied in the Pamlico River Estuary during 1975-1977. The main source of organic carbon was from phytoplankton productivity, which, together with other sources from within the estuary, provided 64% of the organic carbon inputs. The remaining 36% was mainly from tributaries. Organic carbon losses (sinks) were 80% as water column respiration and 20% as outflow. Sedimentation and benthic respiration are undetermined losses. Total organic carbon (TOC) varied seasonally with the highest levels occurring during the summer months when flow rates were low. Also, TOC normally displayed a gradient with the highest levels consistently in the upper reaches near Washington, N.C. Approximately 79% of the TOC in the estuary consisted of dissolved organic carbon (DOC) which accounted for most of the seasonal variations in TOC. Levels of particulate organic carbon (POC) were fairly constant throughout the year with the exception of sporadic increases in phytoplankton biomass. The largest input of organic carbon to the estuary is from productivity of phytoplankton which is more readily available to organisms utilizing oxygen than the more abundant and less refractory inputs from tributaries. Because of this, the regulation of inorganic nutrient sources (mainly nitrogen) is more important for controlling increases in organic loading than are tributary inputs of organic carbon. (Kiger-NC State)
W78-04816

RADIOECOLOGY,
For primary bibliographic entry see Field 5C.
W78-04820

A STUDY OF HEAT TRANSFER PROCESSES ABOVE A COOLING POND,
Argonne National Lab., IL. Radiological and Environmental Research Div.
B. B. Hicks, M. L. Wesely, and C. M. Sheih.
Water Resources Research, Vol. 13, No. 6, p 901-908, December 1977. 4 fig, 4 tab, 16 ref.

Descriptors: *Cooling water, *Illinois, *Powerplants, *Heat transfer, *Lakes, Water cooling, Nuclear powerplants, Heated water, Heat, Sampling, On-site investigations, On-site data collections, Data collections, Data processing, Measurement.

Rapid response instrumentation mounted on a fixed tower located centrally in a strongly heated cooling pond at a nuclear power facility has enabled the evaluation of the turbulent fluxes of momentum, moisture, and sensible heat. The results agreed well with evaluations based on stability-corrected bulk aerodynamic fomulations, provided all atmospheric measurements are made close to the water surface and in a location with adequate upwind fetch. The bulk formulas are those that have been verified recently over more extensive water surfaces, with a minor modification based on the finding that the surface of the cooling pond appears to be significantly smoother than that of open ocean. (Sims-ISWS)
W78-04822

LABORATORY STUDIES OF THE INFLUENCE OF THE VELOCITY OF WIND ON THE MOVEMENT OF OIL SLICKS,
Queen Mary Coll., London (England). Dept. of Civil Engineering.
J. Allen, and J. C. M. Thanarajah.
Journal of Hydraulic Research, Vol. 15, No. 4, p 297-310, 1977. 8 fig, 3 tab, 83 ref.

Descriptors: *Path of pollutants, Water pollution sources, *Laboratory tests, *Oily water, *Surfaces, *Wind velocity, Laboratory equipment, Velocity, Movement, Open channels, Velocity, Waves(Water), Data collections, Foreign research, Oil slicks, Ahlborn tank, Wind tunnel.

In order to investigate the influence of the wind upon the movement of oil slicks on water, experiments were performed using an open channel placed inside a wind tunnel. The channel was specially designed Ahlborn tank which was arranged so that the direction of flow of the water could be reversed easily, thus enabling the water to be pumped either with or against the direcion of the wind. A detailed investigation of the wave motion in the liquid also was performed, since this was clearly an important factor affecting both the velocity and the spreading of the oil. An attempt was made to relate the significant height of the waves on the water surface to the effective roughness factor, k, in the equation for the velocity distribution in the air. The results seem to be surprisingly consistent. The velocities of the oil, and of the air and water between which it was sandwiched, were measured for a wide range of oils. As the wind velocity rose, the ratio of the oil-slick velocity to the wind velocity also rose to a maximum of approximately 8% for the least viscous oil. This type of behavior persisted if there was no pumping of the water or if pumping occurred in either direction. The oils of high viscosity tended to move more slowly than the others. This was found to be true regardless of the direction of pumping, and also if there was no pumping taking place. Throughout the investigations there appeared to be no correlation between the slick velocities and the relative velocity of the air to the liquid. (Humphreys-ISWS)
W78-04847

TURBULENT DIFFUSION IN CHANNELS WITH A SURFACE COVER,
University of Science and Technology, Kumasi (Ghana), Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-04848

LONG TERM PEACE RIVER CHARACTERISTICS AS A MEASURE OF A PHOSPHATE SLIME SPILL IMPACT,
University of South Florida, Tampa. Dept. of Chemistry.
D. F. Martin, and Y. S. Kim.
Water Research, Vol. 11, No. 11, p 963-970, 1977. 2 fig, 3 tab, 30 ref.

Descriptors: *Florida, *Phosphates, *Water quality, *Phosphorus compounds, *Water pollution sources, *Chemical analysis, Chemical wastes, Analytical techniques, Fertilizers, Phosphorus, Red tide, Fish toxins, Slime, Water analysis, Nutrients, Iron, Molybdenum, Pollutant identification, *Phosphate slime spill, *Peace River(Fla), Orthophosphates.

Selected stations on the Peace River, Florida, were sampled following a spill of phosphate slime (3,800,000L) into the river in 1972. Selected chemical analyses were repeated in 1974 to determine the long-term effect of the phosphate slime spill. Constituent fluxes were calculated (kg constituent/s) for each station, and percent deviations from calculated values for successive stations also were calculated. Short-term effects of the spill were identified, and diffferences in the significant correlations also appeared. Deviations from calculated values were associated with dilution in 1972 for phosphorus, iron, and molybdnum; in 1974, the dilution effect seemed evident only for phosphorus. The implications in terms of the phosphate slime spill and the effect on red tide blooms near the mouth of the river were considered. (Henley-ISWS)
W78-04850

MEASUREMENTS OF THE SUMMER CURRENTS IN SAGINAW BAY, MICHIGAN,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2H.
W78-04851

DEVELOPMENT OF MODELS FOR PREDICTION OF SHORT-TERM FATE OF DREDGED MATERIAL DISCHARGED IN THE ESTUARINE ENVIRONMENT,
Tetra Tech, Inc., Pasadena, CA.
M. G. Brandsma, and D. J. Divoky.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A027 131, Price codes: A13 in paper copy, A01 in microfiche. Final Report to U.S. Army Waterways Experiment Station, Vicksburg, Mississippi. Contract Report D-76-5, May 1976. 28 fig, 4 tab, 35 ref, 5 append. DACW39-74-C-0075.

Descriptors: *Model studies, *Dredging, *Forecasting, Estuaries, Estuarine environment, Disposal, Velocity, Numerical analysis, Fluid mechanics, Solid wastes, *Dredged material, Particles.

The study provided definitive information on the environmental aspects of dredging and dredged material disposal operations and for predicting the short-term fate of dredged material discharged in the estuarine environment. Two numerical models were developed; one for the instantaneous dumped discharge, and one for fixed or moving jet discharge. The models accounted for land boundaries, depth variations in the estuary, ambient current variations in three dimensions and in time, and variations of ambient density profiles in time. The models were capable of tracking up to 12 classes of solid particles plus the fluid fraction of a discharge through convective descent, dynamic collapse, and passive diffusion phases. Although the models were quite complex, the input data requirements for most cases were simple and allowed the first-time user to run a simple case in a few hours. The model underwent limited testing, and the results produced were reasonable. In cases involving complex ambient velocities, the models were extremely dependent on good quality velocity data. (Roberts-ISWS)
W78-04854

EFFECTS OF ABANDONED LEAD AND ZINC MINES AND TAILINGS PILES ON WATER QUALITY IN THE JOPLIN AREA, MISSOURI,
Geological Survey, Rolla, MO. Water Resources Div.
J. H. Barks.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-274 392

Descriptors: *Mine drainage, *Path of pollutants, *Zinc, *Lead, *Cadmium, *Missouri, Mine wastes, Heavy metals, Water quality, Sampling, Groundwater, Streams, Water pollution sources, *Joplin aarea(MO).

Dissolved zinc concentrations in the Joplin area, Mo., averaged 9,400 micrograms per liter in water from abandoned lead and zinc mines, some of which discharge at the surface. Contamination of the shallow aquifer (cherty limestones) by the highly mineralized mine water is limited to the immediate mining area. The quality of water in the deep aquifer (cherty dolomites and sandstone) is generally excellent. Dissolved zinc concentrations averaged 16,000 micrograms per liter in runoff from tailings areas. However, during a summer storm, runoff from a 7-acre tailings area contained maximum dissolved zinc, lead, and cadmium concentrations of 200,000; 400; and 1,400 micrograms per liter, respectively. Mine-water discharges increase dissolved zinc concentrations in receiving streams from a background of about 40 to about 500 micrograms per liter during periods of low flow. The higher concentrations are sustained during high flow by runoff from the tailings areas. Deposition of tailings on stream bottoms increases zinc concentrations in bottom material from a background of about 100 to about 2,500 micrograms per gram and increases lead concentrations in bottom material from about 20 to about 450 micrograms per gram. (Woodard-USGS)
W78-04865

EFFECTS OF ABANDONED LEAD AND ZINC MINES AND TAILINGS PILES ON WATER QUALITY IN THE JOPLIN AREA, MISSOURI,
Geological Survey, Rolla, MO. Water Resources Div.
J. H. Barks.
Paper presented at the 1977 SME Fall Meeting and Exhibit, held in St. Louis, Missouri, October 19-21, 1977: Society of Mining Engineers of AIME, No 77-AG-308, Salt Lake City, Utah, 1977. 18 p, 10 fig, 1 tab, 2 ref.

Descriptors: *Mine drainage, *Path of pollutants, *Zinc, *Lead, *Cadmium, *Missouri, Mine wastes, Heavy metals, Water quality, Sampling, Groundwater, Streams, Water pollution sources, *Joplin area(Mo).

Dissolved zinc concentrations in the Joplin area, Mo., averaged 9,400 micrograms per liter in water from abandoned lead and zinc mines, some of which discharge at the surface. Contamination of the shallow aquifer (cherty limestones) by the highly mineralized mine water is limited to the immediate mining area. The quality of water in the deep aquifer (cherty dolomites and sandstone) is generally excellent. Dissolved zinc concentrations averaged 16,000 micrograms per liter in runoff from tailings areas. However, during a summer storm, runoff from a 7-acre tailings area contained maximum dissolved zinc, lead, and cadmium concentrations of 200,000; 400; and 1,400 micrograms per liter, respectively. Mine-water discharges increase dissolved zinc concentrations in receiving streams from a background of about 40 to about 500 micrograms per liter during periods of low flow. The higher concentrations are sustained during high flow by runoff from the tailings areas. Deposition of tailings on stream bottoms increases zinc concentrations in bottom material from a background of about 100 to about 2,500 micrograms per gram and increases lead concentrations in bottom matrerial about 20 to about 450 micrograms per gram. (Woodard-USGS)
W78-04866

FACTORS AFFECTING MICRODISTRIBUTION OF STREAM BENTHIC INSECTS,
Idaho State Univ., Pocatello. Dept. of Biology.
C. F. Rabeni, and G. W. Minshall.
Oikos, Vol. 29, 1977. p 33-43. 5 tab, 6 fig, 36 ref.

Descriptors: *Aquatic insects, Aquatic drift, *Sediment, Aquatic populations, Biological communities, *Benthos, Benthic fauna, Distributions, Detritus, Currents, Methodology, *Productivity, Dissolved oxygen, *Microdistribution, *Substrates, *Riffles, *Current velocity.

The microdistribution of stream insects in relation to current velocity, substratum particle size, silt, and detritus was studied in field experiments utilizing substratum-filled trays. 31% more organisms occurred in trays placed in a riffle than in those placed in a pool. In both riffle and pool the amount of colonization for most taxa was least on the smallest substratum sizes studied (0.5-0.7 cm diam.), was greater on the 1.0-2.0 cm size, reached a maximum on the 2.5-3.5 cm size, and was markedly reduced on the largest substratum size (4.5-7.0 cm). The reduction of current velocity alone accounted for reductions in the numbers of four and five species, while the addition of a light coating of silt significantly reduced the numbers of only three species. The substratum-detritus interaction was the overriding influence on insect microdistribution under conditions of this study and current velocity and a light deposition of silt play only secondary roles. A general model was formulated to show the interaction of biotic and abiotic factors which influence the microdistribution of stream insects. (Katz)
W78-04881

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, I. SALINITY VARIATIONS AND ESTIMATION OF RESIDENCE TIME,
Wollongong Univ. (Australia). Dept. of Chemistry.
J. Ellis, S. Kanamori, and P. G. Laird.
Australia Journal of Marine and Freshwater Research, Vol. 28, 1977, p 467-477. 1 tab, 2 fig, 19 ref.

Descriptors: *Salinity, *Lakes, Lagoons, Lake basins, Monitoring, On-site-investigations, Rainfall, Rainfall-runoff relationship, *Tidal marshes, Tidal effects, Tidal waters, Coastal structure, *Chlorides, Thermal water, *Water temperature, *Australia, *Flushing time, *Lake Illawarra, *Saline coastal lagoons, New South Wales.

Surface and bottom water salinities of Lake Illawarra, a saline coastal lagoon, were determined at 10 monitoring stations over a 2-year period. Mean salinity is controlled primarily by rainfall and varied from 12.8 to 31.3o/oo during the monitoring period. The rate of flushing of Lake Illawarra by tidal action and by freshwater entry was estimated from salinity variations and by mathematical modelling; for dry periods a flushing time (for reduction of a factor of e) of about 60 days was calculated for a conservative substance introduced into the lake. Mean tidal volume was 1% of the lake volume. Vertical mixing by wave action is complete within 2-4 weeks. Although the major creeks are on the western side of the lake, no significant east-west salinity gradient was found. Lake Illawarra is charcterized by the small ratio of catchment to lake area and the short distance from the very elevated watershed to the lake shores, resulting in rapid response to rainfall. The volume of direct precipitation was estimated to be comparable with creek input. (See also W78-04883 and W78-04884) (Katz)
W78-04882

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, II. THERMAL BEHAVIOUR,
Wollongon Univ. (Australia). Dept. of Chemistry.
J. Ellis, and S. Kanamori.
Australian Journal of Marine and Freshwater Research, Vol. 28, 1977. p 479-484. 1 tab, 3 fig, 8 ref.

Descriptors: *Salinity, *Lakes, *Lagoons, On-site-investigations, Tidal water, Thermal variation, Water temperature, Monitoring, Methodology, Sea water, *Thermal power plant, *Thermal pollution, *Thermal stratification, Air temperature, Water pollution effects, *Australia, *Powerplants, Thermal pollution, *Lake Illawarra, New South Wales, *Vertical temperature gradients, Temperature variations.

Temperature variations in surface and bottom water at 10 monitoring stations in Lake Illawarra were determined over the period of 28 January 1972 to 31 May 1974. Except for the bay near Tallawarra Power Station, no permanent vertical temperature gradients were found. A statistically significant correlation was found between water temperature and distance from the power station, but no such relationship could be established for tidal heat flow either alone or acting together with the thermal discharge from the power station. Mean water temperature for Lake Illawarra fluctuated in the range 11.6-25.6C, compared with 15.7-24.0C for the sea adjacent to Wollongong Harbour. Seasonal maxima and minima in lake water temperature occur 3 weeks earlier than those of the sea. (See also W78-04882 and W78-04884) (Katz)
W78-04883

WATER POLLUTION STUDIES ON LAKE ILLAWARRA, III. DISTRIBUTION OF HEAVY METALS IN SEDIMENTS,
Wollongong Univ. (Australia). Dept. of Chemistry.
J. Ellis, and S. Kanamori.
Australian Journal of Marine and Freshwater Research, Vol. 28, 1977, p 485-496. 4 tab, 6 fig, 72 ref.

Descriptors: Metals, *Copper, *Zinc, *Cadmium, *Lead, Sediments, Water pollution effects, Path of pollutants, Australia, *Industrial wastes, Commercial fish, Shrimp, Sediment distribution, Sediment transport, *Heavy metals, *Lake Illawarra, *Heavy metal vertical profiles, Steel mills, Copper smelting.

Samples of recent sediments from 18 sites in Lake Illawarra showed marked enrichment of copper, zinc, cadmium, and lead. The highest concentrations were found in Griffins Bay in the north-east corner of the lake, which is closest to the Port Kemble industrial complex. Maximum enrichments for copper, zinc, and lead are respectively 4, 34, and 11 times the background concentrations found in deep cores. By comparison of vertical profiles of heavy metal concentration with historical data on the growth of metal smelting industries in the Illawarra region, the recent sedimentation rate has been estimated as 2.5-3 mm/year. A depth of 40-50 cm below the surface of the sediment marks the beginning of human influence on the lake. (See also W78-04882 and W78-04883) (Katz)
W78-04884

THE COMMON MUSSEL MYTILUS EDULIS AS AN INDICATOR OF TRACE METALS IN SCANDINAVIAN WATERS. I. ZINC AND CADMIUM,
Uppsala Univ. (Sweden). Inst. of Zoology.
For primary bibliographic entry see Field 5A.
W78-04890

CHARACTERIZATION AND TREATMENT OF WASTE DISCHARGED FROM HIGH-DENSITY CATFISH CULTURES,
Tennessee Valley Authority, Chattanooga. Div. of Environmental Planning.
R. J. Ruane, T-Y. J. Chu, and V. E. Vandergriff.
Water Research, Vol 11, p 789-800, 1977. 8 fig, 6 tab, 18 ref.

Descriptors: *Temperature, *Heated water, *Waste water(Pollution), Population, Wastes, *Catfishes, *Productivity, Water quality, Laboratory tests, Growth rates, Nitrogen compounds, Biomass, Sedimentation rates, Biochemical oxygen demand, Aquiculture, Chemical oxygen demand, Nutrients, Ammonia nitrates, Nitrites, Coliforms, Nitrogen compounds, Thermal pollution.

Warm condenser cooling water that was discharged from a steam-electric power plant was used to achieve optimum temperature levels for high-density production of catfish. The heated water extended the catfish growing season, enhanced growth rates and increased production poundage. Characteristics of the wastewater from the high-density warm water culture (90 to 160 g of fish per liter of water and average water temperature of 28.2C) were evaluated including evaluation of settleable solids, suspended solids, biochemical oxygen demand, chemical oxygen demand, total and soluble phosphates, ammonia nitrogen, organic nitrogen, nitrate, and nitrite nitrogen, and fecal coliform bacteria for hourly and daily variations and for the effects of feeding on waste production. Unit waste loads were computed and compared to limits promulgated by the U.S. Environmental Protection Agency. A pilot-scale sedimentation basin was evaluated for reducing settleable solids, suspended solids, chemical oxygen demand, and phosphates. Difficulties in reducing fecal coliforms were discussed. (Klein)
W78-04898

55FE IN PACIFIC OCEAN PLANKTON,
Oregon Coll. of Education, Monmouth.
C. D. Jennings.
Marine Biology, Vol. 44, 1977. p 223-226. 2 fig, 14 ref.

Descriptors: *Iron, *Metals, Pacific Ocean, Zooplankton, Plankton, *Radioactivity, *Radioecology, *Radioactive wastes, Monitoring, Path of pollutants, Copepods, Laboratory analysis, Nuclear tests, Mururoa Atoll.

The specific activity of 55Fe in plankton increased from below detectable limits at 20 deg N to a maximum of 130 nCi/g Fe at 20 deg S and then decreased to 5 nCi/g Fe at 50 deg S. Along an east-west track near 15 deg S a peak of 90 nCi/g Fe occurred at 135 deg W. It is suggested that this maximum is the result of fallout from French nuclear tests at Mururoa Atoll (22 deg S; 139 deg W). The increase in 55Fe at high latitudes observed in previous studies in the North Atlantic Ocean and North Pacific Ocean did not occur in the South Pacific Ocean which supports the suggestion that belts of high tropospheric fallout accounted for the increase in the Northern oceans. (Katz)
W78-04903

ON THE DISTRIBUTION OF PARTICULATE METALS, CHLOROPHYLL AND SESTON IN THE BALTIC SEA,
Biologische Anstalt Helgoland (West Germany).
H. P. Weigel.
Marine Biology, Vol. 44, 1977, p 217-222. 3 tab, 3 fig, 29 ref.

Descriptors: *Copper, *Iron, *Zinc, *Cadmium, *Lead, *Metals, *Phytoplankton, Chlorophyll, *Primary productivity, Water quality, Laboratory tests, Seston, Salinity, Carbon, Carbon cycle, Path of pollutants, *Baltic Sea, Particulate matter, *Particulate metals, Photic layer, Hydrography.

During the end of the phytoplankton spring bloom, about 100 water samples were taken at 23 stations in the Baltic Sea. The samples were analyzed for particulate Cu, Fe, Zn, Cd, and Pb by atomic absorption as well as for chlorophyll and seston. Two different water masses could be differentiated and these were separated by the halocline. The concentrations of particulate metals are in accordance with those published by other authors. No significant differences could be calculated between mean values of particulate metal concentrations in the two water bodies. Correlations between particulate metal concentrations and chlorophyll, seston, phytoplankton carbon and cell-count were calculated for both photic layer and deeper waters. Significant correlations were found only in the photic layer. The importance of standing crop for metal accumulation in seston is discussed. (Katz)
W78-04904

THE PERSISTENCE OF CHRONICALLY ACCUMULATED HYDROCARBONS IN THE HARD SHELL CLAM MERCENARIA MERCENARIA,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5C.
W78-04905

ZINC AND CADMIUM IN THE PACIFIC HAKE MERLUCCIUS PRODUCTUS OFF THE WESTERN U.S. COAST,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 5C.
W78-04907

ORGANOCHLORINE RESIDUES IN FISH AND FISHERY PRODUCTS FROM THE NORTHWEST ATLANTIC,
Fisheries and Marine Service, Halifax (Nova Scotia).
G. G. Sims, J. R. Campbell, F. Zemlyak, and J. M. Graham.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 6, p. 697-705, 1977. 1 fig, 7 tab, 6 ref.

Descriptors: *Polychlorinated biphenyls, *DDT, Fish physiology, *Animal metabolism, *Pesticide residues, *Crustaceans, *Chlorinated hydrocarbon pesticides, *Lipids, *Dieldrin, *Commercial fish, *Commercial shellfish, Gas chromatography, Water pollution, Canada, *Bluefin tuna, Northwest Atlantic Ocean.

The residues of PCBs and DDT metabolities were determined in fish, including many commercially important species, collected off the Atlantic Coast of Canada during 1971 and 1972. The results of analyses of 261 samples representing 29 species of crustacea, bivalves and finfish, indicated widespread distribution of these contaminants and preferential accumulation in lipid rich specimens. On all the species examined, only the bluefin tuna contained residues consistently greater than 1 microgram/gram (3-4 micrograms/gram). (Katz)
W78-04916

ORGANIC COMPOUNDS IN AN INDUSTRIAL WASTEWATER: A CASE STUDY OF THEIR ENVIRONMENTAL IMPACT,
Massachusetts Inst. of Tech. Cambridge. Dept. of Chemical Engineering.
G. A. Jungclaus, V. Lopez-Avila, and R. A. Hites.
Environmental Science and Technology, Vol 12, No 1, p 88-96, 1978. 5 fig, 2 tab, 21 ref.

Descriptors: *Organic compounds, *Degradation, Volatility, *Sediments, *Phenols, *Industrial wastes, *Industrial water, *Herbicides, *Ethers, Gas chromatography, Mass spectrometry, Water pollution effects, Water pollution sources, Public health, Animal populations, Environmental effects.

The wastewater and receiving waters and sediments from a specialty chemicals manufacturing plant were extensively analyzed for organic compounds. The composition of the river water reflected the composition of the wastewater except that some of the compounds appeared to degrade or volatilize in the river. The long-term, low-level exposure to this wide variety of chemicals may have contributed to the lack of biota in this part of the river. (Katz)
W78-04918

NITROGEN CYCLING IN A MARINE PLANKTONIC FOOD CHAIN: NITROGEN FLUXES THROUGH THE PRINCIPAL COMPONENTS AND THE EFFECTS OF ADDING COPPER,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5C.
W78-04921

URBAN RUNOFF QUALITY IN NORTHERN GUAM,
Guam Univ., Agana. Water Resources Research Center.
For primary bibliographic entry see Field 5A.
W78-04944

THE EFFECTS OF SECONDARILY TREATED SEWAGE EFFLUENT ON THE WILLIMANTIC/SHETUCKET RIVER,
Connecticut Univ., Storrs. Biological Sciences Group.
For primary bibliographic entry see Field 5C.
W78-04945

ERTS-1 DETECTION OF ACID MINE DRAINAGE SOURCES,
Ambionics Inc., Washington, DC.
For primary bibliographic entry see Field 5A.
W78-04957

SATELLITE STUDIES OF TURBIDITY, WASTE DISPOSAL PLUMES AND POLLUTION-CONCENTRATING WATER BOUNDARIES,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 5A.
W78-04959

PROJECT DEVELOPMENT AND TECHNICAL DEVELOPMENT PLAN. NEW YORK BIGHT PROJECT.
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 5G.
W78-04969

SURFACE CURRENTS OF THE NORTHEAST CHUKCHI SEA,
Bureau of Land Management, Groton, CT.
G. L. Hufford, B. D. Thompson, and L. D. Farmer.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 10-38, March 1977. 13 fig, 1 tab, 11 ref, append.

Descriptors: *Ocean currents, *Ocean circulation, *Baseline studies, *Water pollution, Oil pollution, Pollutants, Resources development, Alaska, *Outer Continental Shelf, *Chukchi Sea, Surface currents, Pollutant transport.

During August 1976, a detailed study of the surface currents of the northern Chukchi Sea and western Beaufort Sea coasts was attempted from helicopters from the icebreaker USCGC GLACIER. The objective of this report is to describe the surface circulation during open water. The investigation was conducted primarily in the region between Icy Cape and Point Barrow and seaward to the pack ice edge. A chart of this study area is shown. Analysis of the surface currents inside the 18m depth contour taken in August 1976, in the Chuckchi Sea show a southerly flow under the influence of the prevailing easterly-northeasterly winds and that this flow is reversed with little observable time lag when the wind is from the southwest or west. The statistical correlation between wind and water movement gives a means for predicting the rate of movement of pollutants released into this arctic coastal environment. The importance of this southerly flow is that if oil moving offshore or in a spill were to occur offshore, oil could become entrained into the current and be carried south rather than north as the surface currents closer to shore might suggest. (Sinha - OEIS)
W78-04975

CURRENT MEASUREMENT IN POSSIBLE DISPERSAL REGIONS OF THE BEAUFORT SEA,
Washington Univ., Seattle. Dept. of Oceanography; and Washington Univ., Seattle. Applied Physics Lab.
K. Aagaard, and D. Haugen.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 39-95, March 1977. 48 fig. 03-5-022-67.

Descriptors: *Ocean currents, *Dispersion, *Baseline studies, *Pollutants, Sea ice, Alaska, Resources development, *Outer Continental Shelf, *Beaufort Sea, Current measurements, Tidal currents, Pollutant transport.

The objective of this work is to obtain long-term Eulerian time series of currents at selected locations on the shelf and slope of the Beaufort Sea. Such measurements are necessary to describe and understand the circulation on the shelf and the exchange between the shelf and the deep Artic Ocean. At lease in late winter the currents on the inner shelf appear to be slow. Long-term mean currents are extremely small. The two measurements made north of Norwhal Island showed these small displacements to have been west-southwest. On the outer shelf an entirely different situation prevails. Measurements made at 100 m under the ice from May-September showed the flow to reach over 55 cm sec-1, and even over a 3-month period the mean flow was 13 cm sec-1 toward the east. The most remarkable feature observed was the dominance of the motion by low-frequency variations with a typical time scale of 10 days. These oscillations represent bursts of speed as high as 50 cm sec-1 or more; they are directed eastward and are aligned approximately with the shelf edge. The implication of these measurements with respect to the transport and dispersal of pollutants on the Beaufort shelf is that the ice-covered inner and outer shelf represent very different advective regimes. Over the former, currents are weak and net displacements are small. However, over the outer shelf there are strong currents and pollutants can be transported very long distances. (Sinha - OEIS)
W78-04976

EFFECTS OF SEASONABILITY AND VARIABILITY OF STREAMFLOW ON NEARSHORE COASTAL AREAS,
Alaska Univ., Inst. of Water Resources.
For primary bibliographic entry see Field 4A.
W78-04977

GULF OF ALASKA STUDY OF MESOSCALE OCEANOGRAPHIC PROCESSES (GAS-MOP),
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
S. P. Hayes, and J. D. Schumacher.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 251-328, March 1977. 29 fig, 3 tab, 13 ref.

Descriptors: *Ocean circulation, *Baseline studies, *Advection, *Diffusion, Resources development Alaska, Oil pollution, *Outer Continental Shelf, Pollutant transport, Mesoscale circulation, Gulf of Alaska, Petroleum development.

The objective of this research was to describe the mesoscale oceanic circulation on the continental shelf in the Gulf of Alaska in order to characterize the intermediate scale advective and diffusive processes. These processes are inherently important to the assessment of potential pollution problems due to OCS development. From the data collected and analyzed to date, several preliminary conclusions can be drawn: (1) the shelf break flow is dominated by the Alaskan current system; (2) this system varies in intensity and structure as it proceeds from Yakutat to Unimak Pass; (3) in the Northeast Gulf of Alaska over half of the nontidal variance of the current occurs with time scales of less than a week; (4) the oceanic response to the wind changes character from the midshelf region where it is consistent with Ekman setup to the inner shelf region where direct windstau setup becomes more important; (5) near the Copper River the mean flow is low and complex; (6) near Kodiak Island the shelf break flow is intense; however, on the shelf itself the flow is weak and tidally dominant; and (7) throughout the Gulf of Alaska a seasonal trend is clear with higher velocities occurring in winter. (Sinha - OEIS)
W78-04978

NUMERICAL STUDIES OF ALASKAN REGION,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
J. A. Galt, J. E. Overland, C. S. Smyth, Y. J. Han, and C. H. Pease.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 329-406, March 1977. 31 fig, 5 ref.

Descriptors: *Baseline studies, *Ocean currents, *Models, *Oil spills, *Water pollution, Alaska, Computers, Resources development, Meteorology, *Outer Continental Shelf, Pollutant transport, Puget Sound(WA).

A synopsis of modeling efforts in support of OCSEAP work around Alaska is presented. Included are program development for an advanced spill model for use anywhere along the Alaskan coast, diagnostic model studies of ocean surface currents around Kodiak, advection trajectory model studies in the Gulf of Alaska, a coastal marine meteorology model applied along the southeast Alaskan coast, a study of the circulation of the Bering Sea, and a report on the status of computer hardware and software in support of the modeling efforts. The basic framework of the advanced oil spill model has been completed. Documentation the form of a programmers and users manual is being written describing the special features of the overall model and the available algorithms. (Sinha - OEIS)
W78-04979

BRISTOL BAY OCEANOGRAPHIC PROCESSES (B-BOP),
National Oceanic and Atmospheric Administration, Boulder, CO. Pacific Marine Environmental Lab.
J. D. Schumacher, and R. L. Charnell.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 407-472, March 1977. 15 fig, 1 tab, 4 ref, 3 append.

Descriptors: *Ocean circulation, *Baseline studies, *Advection, *Diffusion, Resources development, Alaska, Resources development, *Outer Continental Shelf, Bristol Bay, Pollutant transport.

Beginning in autumn 1975, investigations were begun in Bristol Bay to relate oceanic advective and diffusive processes to potential pollution problems due to OCS development. Two specific goals were to describe the general water circulation in the study area for both summer and winter regimes; and to determine the spatial and temporal variability of the velocity field and obtain indications of spatial coherence. The Bering Shelf is oceanic in nature, and the Central Shelf water is highly stratified and bounded on the shoreward perimeter by a structure front separating it from a well-mixed coastal water. Current meter records can be characterized as dominantly tidal with low net flow. The net flows, however, confirm the counterclockwise flow around the shoreward perimeter of the Bay and the northwest flow along the slope. Winter circulation is poorly resolved; however, current reversals and phase differences in low-frequency periodicity are suggested. Heat budget analyses have been preliminarily examined and bottom-mounted pressure gage and atmospheric data have been collected. (Sinha - OEIS)
W78-04980

STD MEASUREMENTS IN POSSIBLE DISPOERSAL REGIONS OF THE BEAUFORT SEA,
Washington Univ., Seattle. Dept. of Oceanography.
K. Aagaard.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 473-507, March 1977. 21 fig, append. 03-5-022-67.

Descriptors: *Baseline studies, *Ocean circulation, *Dispersion, *Advection, Resources development, Alaska, Pollutants, Oil pollution, *Outer Continental Shelf, Pollutant transport, Season variations, Beaufort Sea.

Through a series of CTD sections across the Beaufort Sea shelf the seasonal hydrographic sequence from fall to spring in one year, and from fall to winter the next, have been traced. Not only are there large seasonal changes in he hydrography, but conditions are also different from one year to the next. The Beaufort Sea shelf is certainly not neutral with respect to the Arctic Ocean to the north. Rather there are one or more forms of interaction, in which water and the substances it transports are exchanged between the shelf and the offshore regions. The most dramatic evidence of exchange is the series of four sections from fall 1976, in which an intense subsurface current core appears to be sweeping up the slope and onto the shelf, flooding at least one section to the innermost station with dense, saline water. The general thrust of this work is toward understanding the diffusive and advective processes which transport and disperse pollutants and substances of biological and geological importance. (Sinha-OEIS)
W78-04981

YUKON DELTA COASTAL PROCESSES STUDY,
Houston Univ., Houston, TX. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W78-04982

LAGRANGIAN SURFACE CURRENT MEASUREMENTS ON THE OUTER CONTINENTAL SHELF,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological Labs.
D. V. Hansen.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 554-573, March 1977. 7 fig.

Descriptors: *Baseline studies, *Resources development, *Ocean currents, *Oil spills, Alaska, *Outer Continental Shelf, Pollutant transport, Gulf of Alaska, Bering Sea, Lagrangian measurements.

The objectives of this work are to obtain Lagrangian current data for assessment of probable trajectories of oil spills in the Gulf of Alaska and the S.E. Bering Sea using drogued free drifting buoys located several times daily by a satellite positioning system. During the 1976 field season nine buoys were deployed in the Gulf of Alaska, primarily off Yakutat, and three were deployed in the S.E. Bering Sea. Results show that at least during summer conditions, materials released on the surface between Yakutat and Kayak Island will move generaly westward at typical speeds of 10 miles/day or less. There is a pronounced tendency for movement inshore across the shelf, rather like the seasonal transport of pelagic organisms across the shelf in Sprin, and for involvement of surface materials in an eddy west of Kayak Island, off the Copper River. The high percentage of buoys that have gone ashore on the approaches to or inside of Prince William Sound suggest these likely impingement points for oil spilled on the surface over any part of te OCS as far away as Yakutat. Oil from the more distanc points is likely to be well weathered before reaching the Prince William Sound area. (Sinha-OEIS)
W78-04983

STUDY OF CLIMATIC EFFECTS ON FAST ICE EXTENT AND ITS SEASONAL DECAY ALONG THE BEAUFORT-CHUKCHI COASTS,
Colorado Univ., Boulder. Inst. of Arctic and Alpine Research.
R. G. Barry.
In: Environmental Assessment of the Alaskan Continental Shelf. Principal Investigators' Reports for the Year Ending March 1977, Vol 14. Transport, p 574-743, March 1977. 10 fig, 15 ref, 5 append.

Descriptors: *Baseline studies, *Resources development, *Sea ice, Climate, Hazards, Oil spills, Alaska, *Outer Continental Shelf, *Fast-ice, Pollutant transport, Ice break-up, Beaufort Sea, Chukchi Sea.

The most significant hazard to petroleum development along the Beaufort Sea coast is posed by the occurrence of sea ice. A 'calendar' of the fast-ice regime on the Beaufort Sea coast provides a tentative framework for seasonal scheduling of operations in the nearshore zone. Hazards to petroleum development are identified within the fast-ice zone. These include: the occurrence of grounded ice masses within the 20m isobath, as a result of winter extension of the fast-ice edge; shear and pressure ridge features exerting significant forces on structures or bottom gouging will tend to occur further seaward in late winter; grounded ice ridges are discontinuous along the coast and therefore may not contain under-ice oil spills located within the fast-ice zone. The period of stable fast-ice inside about the 15m isobath extends approximately from February to early May. (Sinha-OEIS)
W78-04984

MECHANICS OF ORIGIN OF PRESSURE RIDGES, SHEAR RIDGES AND HUMMOCK FIELDS IN LANDFAST ICE,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-04985

CIRCULATION AND WATER MASSES IN THE GULF OF ALASKA,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 2L.
W78-04991

MODELING OF TIDES AND CIRCULATIONS OF THE BERING SEA,
Rand Corp., Santa Monica, CA.
For primary bibliographic entry see Field 2L.
W78-04996

COASTAL METEOROLOGY OF THE ALASKAN ARCTIC COAST,
Washington Univ., Seattle. Polar Research Center.
For primary bibliographic entry see Field 2B.
W78-04997

NORTON SOUND/CHUKCHI SEA OCEANOGRAPHIC PROCESSES (N-COP),
Washington Univ., Seattle. Dept. of Oceanography; and National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 2L.
W78-04998

ALTERATIONS OF TERRACE DEPOSITS AND BEACHES OF THE COLORADO RIVER IN GRAND CANYON,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 2J.
W78-05004

DETERMINATION OF NITRATE BY ANION EXCHANGE WITH ULTRAVIOLET DETECTION,
Iowa State Univ., Ames. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W78-05011

SOLUTION, DIFFUSION AND SORPTION IN THE UPPER LAYER OF LAKE SEDIMENTS: V. THE DIFFERENTIATION OF THE PROFUNDAL SEDIMENTS OF AN OLIGOTROPHIC MOUNTAIN LAKE (FELDSEE,

HOCHSCHWARZWALD) BY SEDIMENT WATER INTERACTION, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Inst.
U. Tessenow.
Arch Hydrobiol Supplement B 47(3), p 325-412, 1975.

Descriptors: *Sediment-water interface, *Lake sediments, Oligotrophy, Lakes, *Diffusion, Sorption, Iron, Manganese, Phosphates, *Feldsee(West Germany), *Oxidation-reduction potential.

The redox and concentration conditions at the sediment water interface of the lake investigates (in West Germany) lead to a strong differentiation of the Fe, Mn and phosphate contents in the sediments according to lake depth. A loss of mobile compounds from the upper anerobic region occurs with subsequent accumulation in the very deepest anaerobic region and in the lower part of the aerobic region. The results of this is a migration of relatively mobile Fe, Mn and P compounds from the sediment region around the maximum depth into the sediments of maximum depth and the sediments of the aerobic/anerobic transition zone. This migration causes a partial separation of Fe, Mn, P. There is also permanent migration of Fe(II)-and phosphate ions by diffusion from the deeper sediment layers into the surface layer of the sediment. (See also W75-03571)--Copyright 1975, Biological Abstracts, Inc.
W78-05015

LAND USE CHANGE DETECTION WITH LANDSAT-2 DATA FOR MONITORING AND PREDICTING REGIONAL WATER QUALITY DEGRADATION,
Arkansas Univ., Fayetteville. Dept. of Geology.
H. MacDonald, K. Steele, W. Waite, R. Rice, and M. Shinn.
Available from the National Technical Information Service, Springfield, VA 22161 as N77-10091, Price codes: A10 in paper copy, A01 in microfiche. Final Report, January, 1977, 207 p, 80 fig, 17 tab, 67 ref, 1 append. NAS 5-20810.

Descriptors: *Satellites, *Remote sensing, *Water analysis, *Land use, *Water quality, *Mapping, *Water pollution sources, Surface waters, Surface runoff, Pollutant identifications, Data collections, Monitoring, Sampling, Analytical techniques, Sampling, Hydrologic data, Hydrology, Storm runoff, *Arkansas, *Nonpoint source pollution, *LANDSAT.

A research program was conducted to compare gross water quality data with gross changes in land use and to investigate the feasibility of using LANDSAT-derived land use mapping for monitoring and predicting regional degradation of water quality. The tested hypothesis was that the quality of surface water at any given point within a watershed might be an indicator of land use above that point. Comparison between LANDSAT-1 and -2 imagery provided evidence of significant land use changes in Arkansas during 1972-75; historical water quality data were not available in areas of maximum change. Water quality sampling programs were conducted concurrently with the LANDSAT investigation. Point source pollution has been throughly monitored by analysis of water quality data. Nonpoint pollution sources are great in number and have rarely been cited as major pollution sources. Most nonpoint pollution results from surface runoff. The highly variable nature of surface runoff is affected by land use, rainfall intensity and duration, and antecendent conditions. A comprehensive water analysis program requires monitoring of point and nonpoint source pollution, surface runoff and land use. Stormwater runoff quality analyses are essential at stream segments where land usage indicates a significant impact. LANDSAT imagery data are essential to the monitoring of water quality; the updating of LANDSAT-derived land use maps provides a technique for defining, monitoring and predicting changes in regional water quality. (Seip-IPA)
W78-05018

LINE SOURCE DISPERSION WITH APPLICATION TO MIXING IN RIVER CHANNELS,
Clarkson Coll. of Technology, Potsdam, NY. Dept. of Civil and Environmental Engineering.
H. T. Shen.
Water Resources Bulletin, Vol. 14, No. 1, p 35-45, February 1978. 4 fig, 22 ref.

Descriptors: *Dispersion, *Solutes, *Rivers, *Model studies, Mathematical models, Water pollution, Channels, Mixing, Waste dilution, Uniform flow, Flow, Channel flow, *Path of pollutants, Hydraulics, Lime sources, Nonconservative solutes.

Two-dimensional solutions for transient dispersion of nonconservative dispersants in uniform flow resulting from a transverse line source of variable concentration were obtained using multiple integral transformations. In general, the solutions were in integral forms, which can be evaluated efficiently using Filon's quadratures. Examples were presented for cases of practical interest. Applicability of the solution for modeling dispersion in natural river channel where the distribution of flows across the channel is nonuniform was discussed. (Sims-ISWS)
W78-05021

PSEUDO-LAGRANGIAN DISPERSION ESTIMATES FROM CURRENT METERS,
Ontario Ministry of the Environment, Toronto. Water Resources Branch.
For primary bibliographic entry see Field 2H.
W78-05040

THERMAL WEDGING IN LAKE MACATAWA, MICHIGAN: LONG-TERM IMPACT OF CHANNELIZATION,
Rice Univ., Houston, TX. Dept. of Geology.
For primary bibliographic entry see Field 2H.
W78-05041

DETERMINATION OF TRANSPORT MODEL PARAMETERS IN GROUNDWATER AQUIFERS,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Soil and Water Engineering.
V. V. N. Murty, and V. H. Scott.
Water Resources Research, Vol. 13, No. 6, p 941-947, December 1977. 1 fig, 5 tab, 20 ref.

Descriptors: *Dispersion, *Groundwater, *Aquifers, *Mathematical models, Equations, Solutes, Aquifer characteristics, Groundwater movement, Mass transfer, Optimization, Digital computers, Transport model, Inverse problem, Concentration polynomials.

The hydrodynamic dispersion coefficients in groundwater aquifers can be determined from observed values of solute concentrations. For a two-dimensional aquifer in which the concentrations of a solute are known, an algorithm was developed to determine the values of longitudinal and transverse dispersivities. Concentration polynomials were developed by using double interpolation for a set of selected values of longitudinal and transverse dispersivities. With two of the polynomials, Newton's method was used to find the roots which are the values of the longitudinal dispersivity and the ratio of longitudinal dispersivities to transverse dispersivities. With more than two polynomials, an optimization approach was used in arriving at the values of longitudinal dispersivities and transverse dispersivities. The methods converged to the true values for a good initial estimate of the values. (Visocky-ISWS)
W78-05043

RAPID CITY COMBATS THE EFFECTS OF URBAN RUNOFF ON SURFACE WATER,
Environmental Protection Agency, Pierre, SD.
S. M. Pirner, and L. L. Harms.
Water and Sewage Works, Vol. 125, No. 2, p 48-53, February 1978. 11 fig, 2 tab, 15 ref.

Descriptors: *Urban runoff, *South Dakota, *Water quality, *Surface waters, Data collections, Water pollution sources, On-site investigations, On-site data collections, Chemical oxygen demand, Phosphorus, Suspended solids, Specific conductance, Water pollution, Pollutants, Cities, Watersheds(Basins), *Rapid City(SD), Total suspended solids, Volatile suspended solids.

The primary basin selected for this study is referred to as the Meade Street drainage basin and is located in the southeast portion of Rapid City, South Dakota, which has a population of 43,836 according to 1970 census. The total contributing area of the watershed was 2.70 sq miles, which comprises about 20% of the total city land area. Approximately 70% of the basin has been developed, and consists primarily of middle-class, single-family dwellings, together with the usual scattering of multiple-family units, light industry, shopping markets, and roadside services. Impervious surfaces such as paved streets, driveways, parking lots, and rooftops cover about 19% of the total land surface of the basin. Upper reaches of the watershed remain as grasslands and evergreen forests. The study indicated that runoff contributed gross quantities of sediment to the watershed, and that treatment should focus primarily on solids removal. However, it was cautioned that a substantial portion of the sediment contained in the runoff samples appeared as colloidal particles that will not be removed by simple clarification. (Humphreys-ISWS)
W78-05044

BENTHIC INVERTEBRATES AS WATER QUALITY INDICATORS IN THE PENOBSCOT RIVER, MAINE,
Maine Univ. at Orono. Dept. of Entomology.
For primary bibliographic entry see Field 5A.
W78-05053

NON-POINT WATER QUALITY MODELING IN WILDLAND MANAGEMENT: A STATE-OF-THE-ART ASSESSMENT VOL. II: APPENDIXES.
Forest Service (USDA), Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 949, Price codes: A25 in paper copy, A01 in microfiche. Report to Environmental Protection Agency, Athens, Georgia. Report No. EPA-600/3-77-078, 1977. 568 p. 1HB617, EPA-IAG-D5-0660.

Descriptors: *Forecasting, *Water pollution sources, *Watershed management, Hydrologic cycle, Sediments, Pollutants, Model studies, Water quality control, *Wildlands, *Non-point pollution.

Vol. 2 (appendixes) contains the model evaluation forms and watershed inventories compiled as the basis for the conchisions reached and presented in Volume 1 relating wildland management activities with an inventory of monitored watersheds having data suitable for model development and testing. A summary references the models by number and predictive category. (See also W78-03417) (Wares-IPA)
W78-05055

RESUSPENSION OF PLUTONIUM FROM CONTAMINATED LAND SURFACES: METEOROLOGICAL FACTORS,
Environmental Monitoring and Support Lab., Las Vegas, NV. Office of Research and Development.
P. N. Lem, J. V. Behar, and F. N. Buck.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-271 645, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-600/4-77-037, July 1977. 28 p, 2 fig, 2 tab, 122 ref.

Descriptors: *Soil erosion, *Soil analysis, *Soil contamination, Radioactivity, Radioactive wastes, Dusts, Wind erosion, Particle size, Meteorology, Mathematical models, Bibliographies, Reviews, Water pollution sources, *Plutonium, Resuspension process, Transport modeling, Particle dispersion.

A literature review is presented in a discussion of the relevance of meteorological factors on the resuspension of plutonium from contaminated land surfaces. The physical processes of resuspension based on wind erosion work are dependent on air-related factors such as velocity, turbulence, density, and viscosity; on ground features such as specific gravity and moisture; on the soils roughness, cover, obstructions, temperature, and topography; on meteorological factors of wind velocity distribution and moisture content; on surface properties of roughness, area of erodible surface, vegetative cover, and cohesiveness of individual particles; and on particle properties of size/frequency distribution, density, and shape. Some of the models developed to simulate the resuspension of materials for predicting airborne concentrations of plutonium are reviewed, and the significance of some of the parameters used in the different models is discussed. The interplay of meterological factors measured, discussed, or implied in the literature is discussed; however, a satisfactory mathematical formulation of the resuspension process has not yet been devised. (Wares-IPA)
W78-05056

MERCURY DISPERSAL FROM LODE SOURCES IN THE KUSKOKWIM RIVER DRAINAGE, ALASKA,
Geological Survey, Menlo Park, CA.
H. Nelson, B. R. Larsen, E. A. Jenne, and D. H. Sorg.
Science, Vol. 198, No. 4319, November 1977, p 820-824, 2 fig, 1 tab, 18 ref.

Descriptors: *Water pollution sources, *Path of pollutants, *Mercury, Rivers, Alaska, Sediments, River systems, Drainage systems, *Kuskokwin River(Alas).

Mercury content of the Kuskokwim River is due to cinnabar particles in bottom sediments near mineralized areas. Cinnabar-rich sediment disperses the greatest distance in the finest size fraction, extending farther downstream in tributaries than in the main river. Mining activity appears to artifically increase the dispersal distance. On the basis of the average Hg content measured and discharge estimates at the river mouth, it was calculated that a total of 16,700 kg of Hg/year enters the marine environment from the Kuskokwim River. Of this total Hg content, 80% is transported by water, 19% within suspended sediments, and 1% within bed load sediment. (Chilton-ORNL)
W78-05060

LEAD CONCENTRATIONS IN ALGAE AND PLANTS GROWN OVER LEAD CONTAMINATED SEDIMENTS TAKEN FROM SNOW DUMPS IN OTTAWA, CANADA,
Ottawa Univ. (Ontario). Dept. of Chemistry.
J. B. Milne, and M. Dickman.
Journal of Environmental Science and Health, Environmental Science and Engineering, Vol. A12, Nos. 4 and 5, 1977, p 173-189, 2 fig, 3 tab, 18 ref.

Descriptors: Environmental effects, Pollution, *Lead, Algae, Food chains, Snow, Solubility, Canada, *Air pollution effects, Path of pollutants, *Automobile exhaust(Lead emission).

Results of the investigation indicated that algae and Vallisneria americanum grown over sediments contaminated by lead principally from car exhaust, concentrated lead to a significant degree. It was concluded that this lead was transported from the sediment as soluble lead rather than as fine sediment carried by convection currents in the water. It was also concluded that crustaceans, molluscs and fish feeding on these algae are likely to ingest appreciable amounts of lead. (Chilton-ORNL)
W78-05071

HEAVY METALS FROM WASTE DISPOSAL IN CENTRAL PUGET SOUND,
Washington Univ., Seattle. Lab. of Radiation Ecology.
W. R. Schell, and A. Nevissi.
Environmental Science and Techn., Vol 11, No 9, September 197?, p 887-893, 5 fig, 3 tab, 25 ref.

Descriptors: *Heavy metals, Environmental effects, *Water pollution sources, *Waste disposal, Sewage disposal, Waste treatment, Heavy elements, Metals, Lead, Cadmium, Zinc, Mercury, Copper, Nickel, Sediments, Seawater, *Puget Sound(Wash), Biota, Washington.

The results of the measurement of heavy metals in Central Puget Sound waters show that effluent from the West Point sewage outfall does not greatly increase the existing concentrations of the heavy metals measured in the water column and in the biota. Concentrations of Pb and Cd in Central Puget Sound were higher than the average open seawater values while concentrations of the other heavy metals were at or below the open seawater values. The enrichment of heavy metals in sediment layers was determined from the values obtained at the surface when compared with those values obtained from layers which were over 50 years old. Total input of Cu, Pb, and Zn from all sources into Puget Sound is greater than the input from the sewage treatment plant. (Chilton-ORNL)
W78-05073

ENVIRONMENTAL CHEMISTRY OF COPPER IN TORCH LAKE, MICHIGAN,
Texas Univ. at Dallas, Richardson. Center for Environmental Studies.
J. M. Lopez, and G. F. Lee.
Water, Air, and Soil Pollution, Vol. 8, No. 4, October 1977, p 373-385, 7 fig, 4 tab, 12 ref.

Descriptors: Environmental effects, *Water pollution sources, Lakes, *Copper, Sediments, Chemistry, Deposition(Sediments), Suspensions, Solubility, Aqueous solutions, Fish, Algae, Toxicity, *Torch Lake(Mich), Michigan, Lakes, Tailings deposits(Lakes).

Potentially mineable amounts of Cu, contained in tailings deposits and sediments of Torch Lake, are widespread throughout Keweenaw Peninsula. Leaching tests demonstrated that sediments and shore Cu tailings deposits can release potentially significant amounts of Cu when suspended in lake water. Up to 100 microg/l of apparently dissolved Cu were found in the waters at a time of reported spills of cupric ammonium carbonate but relatively high Cu concentrations were found in the lake all year round. Higher Cu concentration values were found in waters which had been affected by Cu mine tailings discharges than in those which had not. Reports of fish and algal populations suggested the occurrence of Cu in a relatively nontoxic form, probably due to the fact that Cu appears to be controlled by hydrous oxides of Fe and Mn and not by solubility relationships of Cu compounds. Sorption onto the surfaces of these minerals could result in reduced toxicity of Cu. (Chilton-ORNL)
W78-05081

ECOLOGY OF A NEW ENGLAND SALT MARSH,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5C.
W78-05093

AN OUTDOOR MODEL SIMULATING A BALTIC SEA LITTORAL ECOSYSTEM,
Swedish Water and Air Pollution Research Lab. Stockholm.
For primary bibliographic entry see Field 5C.
W78-05096

WATER QUALITY EVALUATION OF A LOWER POOL ELEVATION FOR PROPOSED ARCADIA LAKE, OKLAHOMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
K. W. Thornton, D. E. Ford, R. W. Hall, R. L. Eley, and D. L. Robey.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A040 003, Price codes: A04 in paper copy, A01 in microfiche. Technical Report Y-77-3, May 1977. 50 p, 28 fig, 1 tab, 5 ref.

Descriptors: *Arcadia Lake(OK), *Reservoirs, *Water quality, *Simulation analysis, *Model studies, *Elevation, Oklahoma, Lakes, Mathematical models, Algae, Eutrophication, Stratification, Winds, Coliforms, Dissolved oxygen, Multiple-purpose reservoirs, Flood control, Alternative planning, Water supply, Recreation, WORRS model.

To supplement an earlier report evaluating water quality of the proposed Arcadia Lake reservoir on the Deep Fork River near Arcadia, Oklahoma at a pool elevation of 311 m, this report considers a pool elevation of 305 m. The lower elevation would improve dissolved oxygen conditions, but somewhat worsen algal blooms. All projected uses of the reservoir (flood control, municipal and industrial water supply, and general recreation) would be satisfied by lake water quality at the 305-m elevation, as predicted by an improved version of the Water Quality for River-Reservoir Systems model (WORRS). The model was calibrated with meteorological data, and streamflow, physical, chemical, and biological data for 1970 and 1973 in the upper Deep Fork River. Simulation runs indicated that: (1) thermal stratification would be intermittent during the summer; (2) release temperatures may be about 7C warmer than natural downstream temperatures during the summer and early fall; (3) dissolved oxygen generally will be greater than 5 mg/l, with some anoxic periods during intermittent stratification; (4) based on aesthetic criteria, manganese will violate drinking water standards most of the time and iron occasionally in the headwaters of the impoundment; (5) state fecal coliform bacteria standards generally will be met except in headwaters and after storms; and (6) two or three major algal blooms can be expected each year. (Lynch-Wisconsin)
W78-05107

AQUATIC FIELD SURVEYS AT IOWA, RADFORD, AND JOLIET ARMY AMMUNITION PLANTS, VOLUME III - MICROBIOLOGICAL INVESTIGATIONS, IOWA AND JOLIET ARMY AMMUNITIONS PLANTS,
Environmental Control Technology Corp., Ann Arbor, MI.
For primary bibliographic entry see Field 5A.
W78-05114

CHEMICAL DEGRADATION OF MILITARY STANDARD FORMULATIONS OF ORGANOPHOSPHATE AND CARBAMATE PESTICIDES I. CHEMICAL HYDROLYSIS OF DIAZINON,
Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD.

E. P. Meier, M. C. Warner, W. H. Dennis, Jr., W. F. Randall, and T. A. Miller.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A036 051, Price codes: A03 in paper copy, A01 in microfiche. Technical Report 7611, November 1976. 31 p, 11 fig, 5 tab, 10 ref.

Descriptors: *Degradation(Decomposition), *Diazinon, *Pesticides, *Hydrolysis, *Organophosphorus pesticides, *Waste disposal, Acids, Bioassay, Daphnia, Fish, Sunfishes, Rainbow trout, Toxicity, Lethal limit, Pesticide residues, Chemcontrol, Insecticides, Water pollution control.

A study of degradation and disposal methods for the organophosphate pesticide diazinon concludes that strong acid (HCl) hydrolysis degrades diazinon at an acceptable rate, but that before adoption residual toxicity must be reduced or eliminated. Diazinon, which was widespread military and civilian use as an insecticide, generates wastes in three forms: as unserviceable surplus, as excess finished formulation, and as contaminated empty containers. Three currently-used military standard formulations were studied: (1) 47.5% emulsifiable concentrate, (2) 2% dust, and (3) 0.5% oil solution. Degradation methods investigated were strong acid and strong base hydrolysis. Aquatic bioassays, with daphnia, bluegills, and rainbow trout were performed on the final reaction mixtures to determine the reduction in toxicity resulting from chemical treatment. The Department of the Army set the following standards for acceptable methods: (1) low cost and simplicity, with a minimum of reagents and equipment; (2) a reaction time of < 1 week and preferably < 1 day; (3) active ingredient concentration and formulation toxicity reduction by at least 99.9%--an EC50 or LC50 is acceptable; (4) disposal of reaction products in an environmentally acceptable manner. The principal organic product of strong acid hydrolysis was found to be 4-methyl-6isopropyl-2-pyrimidinol, and the principal phosphorus compound was assumed to be diethyl thiophosphoric acid; neither is toxic to aquatic species. (Lynch-Wisconsin)
W78-05120

PERSISTENCE OF AZINPHOSMETHYL IN SOIL,
Environmental Protection Agency, Wenatchee, WA. Field Studies Section.
D. C. Staiff, S. W. Comer, J. F. Armstrong, and H. R. Wolfe.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 265, Price codes: A02 in paper copy, A01 in microfiche. Bulletin of Environmental Contamination and Toxicology, Vol. 13, No. 3, p 362-368, 1975. 4 tab, 6 ref.

Descriptors: *Azinphosmethyl, *Soil contamination, *Pesticide residues, *Persistence, *Hazards, *Toxicity, Pesticides, Soils, Organophosphorus pesticides, Insecticides, Environmental effects, Parathion.

Eight years of tests with azinphosmethyl show that when a high concentration of this organophosphorus pesticide is present as a result of spillage on soil, it may persist for a long time. As azinphosmethyl is orally as toxic as parathion, spillage hazards should be considered equal, especially regarding children and animals. Four years after contamination with undiluted 18.1% liquid emulsifiable concentrate of azinphosmethyl, the 7662 ppm reported at 2.5-7.5 cm was comparable to the near-fatal parathion ingestion at 8634 ppm by a child. Initial soil levels reported for the 18.1% concentration applied to sandy loam (and exposed to normal weathering were very high (25,000-70,944 ppm at the 0-2.5 cm level), but by the end of the first year levels decreased to 33-50% of the original levels. Thereafter the rate of disappearance slowed; by the end of the third year average levels at the two depths were 5218 and 5240 ppm. From the fourth to the eighth years levels at the lower depth were consistently higher than in the top layer, and after eight years levels were 967 and 850 ppm. In tests of leaching, concentrations dropped off rapidly during the first year, with relatively small amounts found thereafter. Emphasis should be given to digging up contaminated soil areas and disposing of the material where it will not be a hazard to small children, animals, or the general environment. (Lynch-Wisconsin)
W78-05121

LIMNOLOGICAL AND FISHERIES SURVEY OF THE UPPER SKUNK RIVER, IOWA,
Iowa State Univ., Ames. Dept. of Zoology and Entomology.
J. R. Jones, D. M. Coon, and R. W. Bachmann.
Iowa State J Res. 48(3), p 255-266, 1974.

Descriptors: Carp, Chlorophyll, Fisheries, *Iowa, Limnological studies, Nutrients, Planktonic, River, Surveys, Water quality, Upper Skunk River(Iowa), Sewage effluents, Water pollution.

In 1970, water-quality data and fish samples were collected from stations along a 50-km reach of the Skunk River near Ames, Iowa. High levels of plant nutrients and planktonic chlorophylls were found. Treated sewage effluents introduced at Story City and Ames produced measureable changes in several chemical parameters. Fewer fish species were found than had been reported in 1892. Present distributions were correlated with the geological structure of the stream channel. The greatest diversity of fish species was upstream from Ames, where the bedrock is close to the surface, forming a heterogeneous streambed of pools and riffles. In the southern part of this reach a low-diversity ichthyofauna dominated by carp was found in a more homogenous substrate of shifting sand. These geological factors seemed more important in determining fish distributions along the river than did the observed water-quality differences.--Copyright 1974, Biological Abstracts, Inc.
W78-05124

TRANSFORMATION OF S35-LABELLED SULPHATE IN AEROBIC AND FLOODED SOIL CONDITIONS,
Indian Agricultural Research Inst., New Delhi. Nuclear Research Lab.
For primary bibliographic entry see Field 2G.
W78-05152

5C. Effects Of Pollution

EFFECTS OF PHYTOPLANKTON ON DISSOLVED OXYGEN CONCENTRATION IN CATFISH PONDS,
Auburn Univ., AL. Water Resources Research Inst.
C. E. Boyd, E. Johnston, C. S. Tucker, R. Romaire, and J. Davis.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 184, Price codes: A03 in paper copy, A01 in microfiche. WRRI Bulletin 30, November 1977. 35 p, 11 fig, 9 tab, 19 ref. OWRT A-0420-ALA(3).

Descriptors: Algae, *Fishkills, Simulation analysis, *Catfish ponds, *Dissolved oxygen, Phytoplankton, *Cyanophyta, Water pollution effects, Fisheries, *Computer models, Model studies, Alabama, Die-offs(Fish), Water pollution control, Potassium permanganate, Pollution abatement.

Dense populations of blue-green algae frequently develop in fish ponds at Auburn, Alabama, during windy weather in March and early April. Massive die-offs of the algae can be expected when surface scums form durig prolonged periods of calm, clear, warm weather between mid April and mid May. Dissolved oxygen concentrations decline following die-offs, and fish kills may occasionally result unless emergency aeration is employed. A computer simulation model for nighttime decline in dissolved oxygen concentrations was developed for channel catfish ponds. The application of potassium permanganate to waters with critically low concentrations of dissolved oxygen did not improve conditions for fish survival. In fact, potassium permanganate should not be applied to ponds with oxygen depletion problems because it kills algae and increases the organic matter available for microbial decomposition. Treatment of channel catfish production ponds with three periodic applications of simazine totaling 1.3 mg/liter drastically reduced phytoplankton density. However, extended periods of low dissolved oxygen concentrations following simazine applications resulted in decreased fish yields as compared to control ponds.
W78-04710

EFFECTS OF DESTRATIFICATION ON DEPTH DISTRIBUTION OF FISH,
Oklahoma Cooperative Fishery Research Unit., Stillwater.
G. E. Gebhart, and R. C. Summerfelt.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol 102, No EE6, p 1215-1228, December 1976. 6 fig, 2 tab, 40 ref. OWRT A048-OKLA(3).

Descriptors: *Dissolved oxygen, *Fish, *Distribution patterns, *Fish behavior, *Oklahoma, *Stratification, Distribution, Fish conservation, Water temperature, Summer, Freshwater, Effects, Water quality, Reservoirs, Lake of the Arbuckles(Okla).

Observations in Lake of the Arbuckles, Oklahoma, in 1973-1975 have indicated that depth distributions of gizzard shad, white crappie, freshwater drum, and black bullhead were markedly affected by conditions of stratification. During stratification, the distribution of all species except the bullhead was limited largely to oxygenated water above the hypolimnion. Fish depth distribution increased substantially after the fall overturn. Operation of an axial flow pump in the summers of 1974-1975 appeared to cause turnover one month earlier than shown for 1973 and for the data collected by others for 1969-1970. (Bell-Cornell)
W78-04713

DISTRIBUTION AND ABUNDANCE OF BENTHIC ALGAE ALONG PHOSPHATE GRADIENTS IN KOOTENAY LAKES, BRITISH COLUMBIA,
For primary bibliographic entry see Field 5B.
W78-04737

LIGHT-SATURATED PHOTOSYNTHESIS BY PHYTOPLANKTON SIZE FRACTIONS IN THE NEW YORK BIGHT, USA,
Lamont-Doherty Geological Observatory, Palisades, NY.
T. C. Malone.
Marine Biology, Vol 42, No 4, p 281-292, 1977. 11 fig, 4 tab, 49 ref. NOAA 03-4-043-310 and 04-5-022-22.

Descriptors: *New York Bight(NY), *Phytoplankton, *Photosynthesis, *Carbon assimilation, *Eutrophication, New York, Hudson River, Algae, Net plankton, Nannoplankton, Water temperature, Indicators.

The response of phytoplankton size fractions to environmental changes was studied in the lower Hudson Estuary and apex of the New York Bight using data gathered for 1975-76 summer and winter phytoplankton blooms. Cell size and chain length,

which influence residence time in the euphotic zone, are important factors in phytoplankton population dynamics and trophic interactions. Copepods favor large cells for grazing, and cell size is also related to suspension in stratified media and distribution in convection cells and upwelling systems. Net plankton blooms were found to occur in late winter (February), and nannoplankton blooms in summer (June). Water temperatures were 2-8C and 18-24C, respectively. Nannoplankton and net plankton assimilation numbers were higher during bloom periods than during transition periods of rapid temperature change (8-18C). Differences in assimilation numbers between size fractions could account for summer nannoplankton dominance, but not winter net plankton dominance. Assimilation numbers were exponential functions of temperature between 8-24C for nannoplankton, and 8-20C for net plankton. Below 8C, net plankton assimilation numbers declined with temperature. Assimilation numbers were occasionally correlated with dissolved inorganic nitrogen. (Lynch-Wisconsin)
W78-04738

PHYTOPLANKTON IN LAKE HJALMAREN,
Uppsala Univ. (Sweden). Inst. of Ecological Botany.
E. Willen.
Abstracts of Uppsala Disserations from the Faculty of Sciences, No 378, ISBN 91-554-0412-X, 1976. 4 fig, 2 tab, 7 ref.

Descriptors: *Phytoplankton, *Lake Hjalmaren(Sweden), *Eutrophication, *Trophic levels, Water pollution, Sewage disposal, Sewage treatment, Lakes, Sweden, Oligotrophy, Mesotrophy, Phosphorus, Nutrients, Algae, Indicators, Nitrogen.

Phytoplankton investigations from 1966-73 in Lake Hjalmaren, a shallow eutrophic lake in a fertile agricultural district near Orebro, Sweden, showed 350 taxa. Cyanophyta, diatoms, and Chlorophyta were richest in species. Of the lake's four basins--Hemfjarden, Mellanfjarden, Storhjalmaren, and Ostra Hjalmaren--Hemfjarden had a higher species diversity (4.13 calculated from Shannon's formula) than Storhjalmaren (2.34), in spite of the fact that the former is more highly polluted than the latter. It appears that the heavy pollution is offset by water circulation, which provides a constant nutrient supply and prevents Cyanophyta shading. Phytoplankton biomass and nutrient concentrations were higher in Hemfjarden-Storhjalmaren than in Storhjarden):10 (Mellanfjarden):3 (Storghalmaren):1(Ostra Hjalmaren). Chlorophyll-a concentration-total phytoplankton volume showed a moderately strong correltion (r=0.71-0.79). Phytoplankton chlorophyll-a content varied from 0.7% in Storhjalmaren-Ostra Hjalmaren to 1.4% in Hemfjarden. Annual primary production was 420 g C/sq m in Hemfjarden, 320 in Mellanfjarden, 170 in Storhjalmaren, and 75 in Ostra Hjalmaren. Comparison with earlier studies showed a decrease of desmids, indicating increased eutrophication. The largest pollution source is biologically treated sewage from Orebro; phosphorus removal was begun in 1975. Data for Lakes Vattern (oligotrophic), Vanern (oligo-mesotrophic), Hjalmaren (ertrophic), and Malaren (eutrophic) indicated nitrogen loadings of 1.3, 2.9, 4.2, and 11.2 g/sq m, and phosphorus loadings of 0.07, 0.17, 0.25, and 0.74 g/sq m. (Lynch-Wisconsin)
W78-04739

ORTHOPHOSPHATE CONCENTRATION AND FLUX WITHIN THE EPILIMNIA OF TWO CANADIAN SHIELD LAKES,
S. Levine.
Verh. Internat. Verein. Limnol., Vol 19, p 624-629, October 1975. 5 fig, 12 ref.

Descriptors: *Orthophosphate, *Nutrient flux, *Phosphorus, *Rigler bioassay method, Canadian Shield, Canada, Phosphates, Epilimnion, Lakes, Nutrients, Eutrophication, Algae, Ontario(Canada), Bioassay, Experimental Lakes Area(Ontario Canada), Analytical techniques.

The Rigler bioassay method was used to estimate orthophosphate concentrations in Experimental Lakes 227 and 302 South in northwestern Ontario, Canada. Orthophosphate is believed to be the form of phosphorus most readily available to algae; of the two available means of estimating its concentration, the Rigler bioassay is more sensitive than the Lean method. Lake 227 received .024 g of phosphorus as H3P04 and .31 g of nitrogen as NaN03 per sq m per week during the summers of 1973-74. For phosphorus this was 20 times the natural load. The south basin of Lake 302 was unfertilized. Integrated eqilimnetic samples were analyzed for total dissolved phosphorus and suspended phosphorus, and water temperature was measured. Orthophosphate-phosphorus concentrations were very low during summer stagnation, and maximum estimated concentrations in both lakes centered around .015 micrograms/l; during dense algal blooms in Lake 227 the concentration dropped below .001 micrograms/l. With fall turnover concentrations increased, but high concentrations (.2-2.3 micrograms/l) did not develop until late winter when algal biomass declined to minimum values. Total dissolved phosphorus remained fairly constant in both lakes throughout the year, averaging 5 micrograms/l in Lake 302 South and 8 micrograms/l in Lake 227. Almost all Millipore filtrate phosphorus was colloidal. Suspended phosphorus varied roughly in proportion to algal biomass and chlorophyll-a changes. (Lynch-Wisconsin)
W78-04740

THE SALINE LAKES OF SASKATCHEWAN,
For primary bibliographic entry see Field 2H.
W78-04741

PRIMARY PRODUCTIVITY AND PHYTOPLANKTON OF LAKES ON THE EASTERN CANADIAN SHIELD,
M. L. Ostrofsky, and H. C. Duthie.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol 19, p 732-738, October 1975. 3 fig, 2 tab, 12 ref.

Descriptors: *Primary productivity, *Phytoplankton, *Lakes, *Canadian Shield, Alakalinity, Conductivity, Bogs, Photosynthesis, Heterotrophy, Quebec(Canada), Labrador Peninsula(Canada), Acidic water, Depth, Color.

Eight Canadian Shield lakes on the Quebec-Labrador peninsula were studied for phytoplankton and primary productivity. Lakes Atilla, Yasinki, Sakami, and Bereziuk are located in the James Bay drainage, and Lakes Atikonak, Lobstick, Michikamau, and Gabbro drain into the Atlantic Ocean. The lakes were all low in alkalinity (pH range of 6.1-6.6), conductivity (16.3-32.7 micromhos/cm), and dissolved nutirent salts, but were colored to varying degrees because of bog influence. Phytoplankton biomass was largely comprised of Chrysophyceae and Bacillariophyceae. The most numerous species in all lakes were the Chrysophyceae Dinobryon divergens and D. bavaricum, and the diatoms Tabellaria fenestrata and Asterionella formosa. Except of Lake Michikamau, the Labrador lakes, shallower and with dendritic shorelines merging with bogs, had more epilithic and terraqueous phytoplankton. Maximum biomass ranged from 51-536 mg/cu m. Typical carbon assimulation-depth curves had distinct maxima at 0.5-1.0 m (4.73-8.22 mg C/cu m/hr), with rates rapidly decreasing with increased depth. Michikanau Lake, with very transparent water, was the only exception, having no distinct maximum. Maximum rates, similar in all lakes, reflected similar dissolved nutrient concentrations. Michikanau Lake's maximum was only 2.16 mg C/cu m/hr. Area production rates varied from 46-267 mg C/sq m/hr. Heterotrophic productivity may be equal to or greater than photosynthetic production in some lakes. (Lynch-Wisconsin)
W78-04743

WATER QUALITY EFFECTS OF POTENTIAL URBAN BEST MANAGEMENT PRACTICES: A LITERATURE REVIEW,
Wisconsin Dept. of Natural Resources, Madison. Bureau of Water Quality.
For primary bibliographic entry see Field 5G.
W78-04744

SUMMARY REPORT 1975: FOOD PROTECTION AND TOXICOLOGY CENTER, UNIVERSITY OF CALIFORNIA, DAVIS.
California Univ., Davis. Food protection and Toxicology Center.
(1975). 86 p, 2 fig, 10 tab, 55 ref. NSF BMS 74-21783 A01 and BMS 75-22756 EPA 68-01-2254.

Descriptors: *Toxins, *Environmental effects, *Water pollution, *Air pollution, *Soil contamination, *Pesticide residues, *Agricultural chemicals, Toxicity, Foods, California, Ecosystems, Pesticides, Parathion, Chlorinated hydrocarbon pesticides, Chemicals, Pollutants, Biomagnification, Path of pollutants.

Since its founding in 1965, the Food Protection and Toxicology Center of the University of California, Davis, has concentrated on three aspects of environmental toxicology: (1) fate and effects of pesticides and other toxicants in the environment; (2) transport of toxicants through air, water, and soil; and (3) effects of agricultural chemicals on farm employee health. Water-related research reported here includes: (1) the environmental impact of chlorinated hydrocarbons project, covering escape of these chemicals from the soil into surface and ground water; and (2) the Monterey Basin pilot montoring project, a total environmental monitoring effort which includes surface, wastewater, and marine biota sampling. Other research projects summarized deal with the insecticides toxaphene and chlordane; detoxification of pesticides; effects of chlorinated hydrocarbons on birds and rodents; chemico-biological interacrtions in rhesus monkeys; organophosphate toxicity; mammalian metabolism of chlorinated hydrocarbons; uptake and excretion of hexchlorobenzene by growing lambs; competitive inhibition of nitrosamine formation; metabolism of aflatoxin B1; systems approach to pesticide contamination control in the San Joaquin Valley (mathematical simulation of ecosystel.. pesticide dynamics, pesticide chemical transformations in air, pesticide dissipation and persistence in soil); and parathion as a public health hazard. (Lynch-Wisconsin)
W78-04745

PHYTOPLANKTON IN SEVEN MONOMICTIC LAKES NEAR ROTORUA, NEW ZEALAND,
E. A. Flint.
New Zealand Journal of Botany, Vol 15, No 2, p 197-208, 1977. 1 fig, 3 tab, 48 ref, 1 append.

Descriptors: *Phytoplankton, *Trophic levels, *Rotorua(New Zealand), *Lakes, New Zealand, Eutrophication, Mesotrophy, Oligotrophy, Zooplankton, Water chemistry, Monomictic lakes, Indicators.

Trophic levels in seven monomictic lakes near Rotorua, New Zealand, were determined by means of phytoplankton samples collected in 1970-71. Results were compared with similar data from 1955-56. Based on phytoplankton species composition and abundance, the lakes were classified as: (1) eutrophic--Lakes Okara and Ngapouri, characterized by algal blooms; (2) mesotrophic--Lakes Rotokakahi and Okataina, where Analbaena spiroides was usually present but no blooms occur; and (3) oligotophic--Lakes Okareka, Rotoma, and

Tikitapu, in which Cyanophyta were rarely seen or absent. Lakes Okaro and Ngapouri are small and shallow, with catchment soils of high natural fertility; Lakes Okataina and Rotoma are large and deep, with low-fertility catchment soils; the remaining three lakes are intermediate in size and depth, with catchment soils of medium to low fertility. Trophic levels in Lakes Rotokakahi, Okataina, and Okareka classify differently if measured by zooplankton or water chemistry. In Lake Rotokakahi the predominance of large algal cells suggests slight eutrophication, whereas its zooplankton and benthic fauna are characteristic of oligotrophy; chemically it is mesotrophic. Lake Okataina is chemically oligotrophic, although its phytoplankton and zooplankton, benthic fauna, and water chemistry. (Lynch-Wisconsin)
W78-04749

STUDIES ON THE LORICA STRUCTURE IN CHRYSOPHYCEAE,
Copenhagen Univ. (Denmark). Inst. of Plant Anatomy and Cytology.
J. Kristiansen.
Svensk Botanisk Tidskrift, Vol 66, p 184-190, 1972. 4 fig, 24 ref.

Descriptors: *Chrysophyceae, *Lorica, *Algae, *Chrysophyta, Plant morphology, Microfibrils, Denmark, Ponds, Lakes, Electron microscopy, Dinobryon pediforme, Dinobryon suecicum, Stenocalyx klarnetii, Epipyxis utriculus, Bitrichia chodatii, Chrysophyxis bipes, Eutrophication.

Electron microscopy was used to study the morphology of the lorica of six species of Chrosophyceae: Dinobryon pediforme, D. Surcicum, Stenocalyx klarnetii, Epipyxis utriculus, Bitrichia chodatii, and Chrysophyxid bipes. Specimens obtained in Danish lakes and ponds were fixed in iodine (Lugol solution) and dried on carbon-coated grids. The lorica generally is composed of cellulose microfibrils. Very little is known of the mechanism of lorica construction or secretion of the cellulose microfibrils. A spiral lorica structure was evident for D. pediforme. As in other Dinobryon species, the microfibrils are depositited in loops, but are arranged in oblique rows, forming a helical construction. The undulating nature of the lorica walls may be related to a helix associated with dense zones of the microfibril loops. In D. Suecicum, the lorical has a prominent spiral ridge. Microgibrils are deposited in loops, but the orientation is turned almost 90 degrees. This structure may be regarded as a further development of that of D. pediforme, and is very similar to Stenocalyx; it is possible that this species belongs to Stenocalyx rather than Dinobryon, evidenced also by the lorica's brownish color and the method of sexual reproduction. Electron microscopy proved that the scales of Epipyxis utriculus are composed of distinct microfibrils and are not amorphous as was previously reported. Bitrichia chodatii has a three-part lorica. The lorica of Chrysopyxis bipes has a very characteristic shape. (Lynch-Wisconsin)
W78-04750

THE FINE STRUCTURE OF SOME PELAGIC FRESH WATER DIATOM SPECIES UNDER THE SCANNING ELECTRON MICROSCOPE. I,
Uppsala Univ. (Sweden). Dept. of Quaternary Geology.
For primary bibliographic entry see Field 2H.
W78-04751

FRESHWATER ALGAL VEGETATION IN THE AZORES,
Vaxtbiologiska Institutionen, Uppsala (Sweden).
C. Johansson.
Separata do Boletim da Sociedade Broteriana, Vol. 50, p 117-141, September 1976. 15 fig, 1 tab, 14 ref.

Descriptors: *Azores Islands, *Algae, *Islands, Portugal, Cyanophyta, Chromophyta, Chlorophyta, Chrysophyta, Dispersion, Biotopes, Data collections, Baseline studies, Freshwater.

Freshwater algae in the Azores were collected in the summer of 1975 on the islands of Terceira, S. Jorge, Pico, and Faial. Virtually all species are found in Europe, most with wide distribution. Sea birds are a very important means of algal dispersion, and man is becoming increasingly important. Aerial algae are the most important group of freshwater algae on the islands. Aerial algae are those that do not grow in water, or at least can grow for periods without being immersed in water. Eight biotopes were studied and the algal vegetation of each is described: (1) rock surfaces in craters (Santa Barbara, Pico das Calderinhas, Calderia); (2) streams (Ribeira do Cavalete, Caldeira); (3) fumaroles (Furnas do Enxofre); (4) cave walls (Serra do Topo area, Furna do Frei Matias); (5) ravine sides and bottoms (Pico das Calderinhas area, Pico do Areeiro area, Serra do Topo area); (6) epiphytic algae on vascular plants and bryophytes (Ribeira da Fonte, Pica de Areeiro area, Pico Volcano, Calderia); (7) lakes (Lagoa do Capitao, Caldeira); and (8) steep road sides (Pica das Caldeirinhas area). A checklist shows 45 taxa of Cyanophyta, 87 taxa of Chromophyta, and 24 taxa of Chlorophyta. The nine islands in the archipelago are all of volcanic origin. The climate is oceanic, with small variations in temperature, large amounts of precipitation, and high humidity. Mean annual temperature is 17.5C. (Lynch-Wisconsin)
W78-04752

ROTORUA PHYTOPLANKTON RECONSIDERED (NORTH ISLAND OF NEW ZEALAND),
Vaxtbiologiska Institutionen, Uppsala (Sweden).
K. Thomasson.
Internationale Revue der Gesamten Hydrobiologie, Vol. 59, No. 5, p 703-729, 1974. 5 fig, 2 tab, 66 ref.

Descriptors: *Rotorua(New Zealand), *Phytoplankton, *Desmids, *Algae, *Classification, New Zealand, *North Island(New Zealand), Lakes, Volcanoes, Monomictic lakes, Species composition, On-site data collections.

An extensive taxonomy of the phytoplankton of nine lakes in the Rotorua lake district on the North Island of New Zealand is based on a collection made in March 1968. The nine lakes studied were Okareka, Okataina, Rotoiti, Rotokawau, Rotoma, Rotomahana, Rotorua, Tarawera, Taupo, and Tikitapu. All of the lakes are warm, monomictic, softwater lakes, mostly volcanic in origin. At the time of sampling, surface temperatures were 20-22C and the thermocline was at 15-20 m. There is no period of winter stability. Altitude ranges from 279-416 m, area from 1.4-606.1 sq km, and maximum depth from 25-174 m. The phytoplankton of the lakes contains a large number of taxa, many of which are abundant; the composition of the plantonic communities is harmonic and well-balanced. Desmid flora are particularly varied and abundant. The rich occurrence of Staurastrum sexangulare, S. unicorne v. gracilis, and S. rosei is characteristic. Euastrum ad Micrasterias are surprinsingly rare. Cyanophyta are sparse, and such common plants as pediastrum and Scenedesmus are infrequent. Peridonium taxa with sculptured plates are common. The last volcanic eruption in the area was Tarawera in 1886; there is nothing about the plankton composition to indicate the violent character of such eruptions. The abundance of hot springs likewise does not seem to affect the planktonic population. Individual comments on selected taxa are included. (Lynch-Wisconsin)
W78-04753

CLOSTRIDIUM PERFRINGENS AND COLIFORM BACTERIA AS INDICATORS OF FAECAL POLLUTION,
Vattentest A. B., Uppsala (Sweden).
For primary bibliographic entry see Field 5A.
W78-04754

WATER QUALITY ASSESSMENT FOR THE PROPOSED RDX-HMX FACILITY, MCALESTER NAVAL AMMUNITION DEPOT, VOLUME I AND II.
Water and Air Research, Inc., Gainesville, FL.
For primary bibliographic entry see Field 5G.
W78-04755

EFFECTS OF CADMIUM, MERCURY, AND SILVER ON MARINE ANIMALS,
National Marine Fisheries Service, Milford, CT. Milford Lab.
A. Calabrese, F. P. Thurberg, and E. Gould.
Marine Fisheries Review, Vol. 37, No. 4, p 5-11, April 1977. 2 fig, 2 tab, 27 ref.

Descriptors: *Cadmium, *Mercury, *Silver, *Hazards, *Environmental effects, *Marine animals, Toxicity, Mullusks, Crustaceans, Fish, Long Island Sound(Milford CT), Adsorption, Sublethal effects, Estuarine environments.

Several species of fish, mollusks and crustaceans collected from Long Island Sound near Milford, Connecticut were exposed to cadmium, mercury and silver as a part of the study on mortality rates and physiological and biochemical changes caused by these heavy metals. Results of the experiments indicate that the order and degree of metal toxicity vary with salinity, metal salt form and life stage of the species. At early life stages the species were more sensitive to mercury and silver than cadmium. Mercury and silver were taken up very readily by tissues of juvenile and adult animals, while cadmium was taken up to a far lesser degree. The order of toxicity in adult animals was reversed from that observed in juvenile stages, with cadmium producing more severe effects than either mercury or silver, despite the much lower rate of cadmium uptake. Examination of tissues from metal-exposed crustaceans and finfish has revealed two basic effects of sublethal metal challenge. (1) Induction of enzymes that are either directly attacked or are involved in the mobilization of energy or participate in the production of metabolites for biosynthesis causes a chronic demand for metabolic energy. (2) The loss of ligand sensitivity interferes with the regulation of the enzyme reaction rates. Since the concentrations of heavy metal pollutants are greatest in the estuarine and inshore coastal waters, their effects represent a serious impairment to the recruitment of fish stock. (Harris-Wisconsin)
W78-04757

FACTORS AFFECTING THE STRUCTURE OF LIMNETIC CRUSTACEAN ZOOPLANKTON COMMUNITIES IN CENTRAL ONTARIO LAKES,
G. W. Sprules.
Verh. Internat. Verein. Limnol., Vol. 19, p 635-643, October 1975. 3 fig, 5 tab, 24 ref.

Descriptors: *Lakes, *Zooplankton, *Killarney Provincial Park(Ontario Canada), *Species diversity, *Hydrogen ion concentration, Ecology, Canada, Crustaceans, Mountains, Ecosystems, Air pollution effects, Water pollution effects, Regression analysis.

Evidence of a strong relationship between low levels of diversity of zooplankton and fish species and low pH levels was found in a study of 47 lakes in or near Killarney Provincial Park on the northeast shore of Georgian Bay (Ontario, Canada). Stepwise regression analysis of total zooplankton species on 28 physical and chemical variables indicated a positive association with pH,

which alone accounts for 53% of the variation in plankton species numbers, a positive association with lake length (18%), and a negative association with lake depth (7%). Addition of total fish species as an independent variable accounts for 80% of the variation in number of zooplankton species. This strong association may result from zooplankton and fish species numbers each being correlated with the same limnological variables. The lakes, situated in the La Cloche mountains, are noted for their exceptional clarity, low pH and TDS, and often impoverished fish and zooplankton faunas. Thirty-seven of the lakes have a pH below 6.0, resulting from airborne industrial pollutants. The total pH range is 3.8-7.0. Number of zooplankton species ranges from 1-16, while fish species vary from 0-17. Diaptomus minutus is the sole zooplankter in five lakes, and constitutes 77->90% of individuals in the other lakes. Low zooplankton diversities in low-pH lakes may result partly from the direct effect of low pH, and partly from increased interspecific competition associated with low fish species diversity. (Lynch-Wisconsin)
W78-04759

PRELIMINARY STUDIES ON THE KINETICS OF UTILIZATION OF ACETATE BY BACTERIOPLANKTON IN MIKOLAJSKIE LAKE,
Warsaw Univ. (Poland). Dept. of Environmental Microbiology.
S. Szymankowski.
Acta Microbiologica Polonica, Vol 25, No 4, p 345-352, 1976. 6 fig, 1 tab, 6 ref.

Descriptors: *Acetate, *Phytoplankton, *Mikolajskie Lake(Poland), *Adsorption, Tracers, Temperature, Oxygen requirements, Eutrophication, Depth, Kinetics.

The kinetics of utilization of acetate by bacterioplankton was measured at three sites on Mikolajskie Lake, Poland by using a modification of a substrate tracing method originally developed by Wright and Hobbie (1965, 1966). The highest rate of acetate utilization was observed in July. The longest acetate utilization time was found to occur in September in the Hypolimnion. Other months showed significant differences in utilization time, with July and August the only exceptions. The latter two months had identical utilization times. The kinetics of acetate utilization showed a decrease with drop of temperature and degree of oxygen saturation, though the former was not so strong as the combined effect of decreased temperature and oxygenation. In all cases the acetate utilization rate dropped with the increase in the water depth. Thus the utilization rate of acetate was generally the highest in the epilimnion and the lowest in hypolimnion. Isotopic techniques such as the one used in this study are used to determine the rate of uptake of dissolved organic matter by heterotrophic planktonic bacteria. (Harris-Wisconsin)
W78-04760

A HYPOTHESIS TO EXPLAIN THE SUCCESSION FROM CALANOIDS TO CLADOCERANS DURING EUTROPHICATION,
D. C. McNaught.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol 19, p 724-731, October 1975. 1 fig, 1 tab, 26 ref. EPA 800536.

Descriptors: *Calanoids, *Cladocerans, *Trophic levels, *Zooplankton, *Foods, *Speciation, Eutrophication, Oligotrophy, Mesotrophy, Crustaceans, Species composition, Succession, Lake Superior, Lake Ontario, Bosmina, Daphnia, Diaptomus, Copepods, Model studies, Bioindicators.

Crustacean zooplankton species composition, long regarded as a eutrophication indicator with larger species replacing smaller ones, is often explained in terms of size-selective predation. It is suggested in this paper that size of food is equal importance. Evolutionary responses to variable phytoplankton foods include: (1) evolution of generalists and specialists regarding selective algal grazing by zooplankton; (2) increased filtering capacity; (3) increased ingestion rate and efficiency; and (4) increased digestion efficiency. Responses to fish predation include: (1) small adult size at maturity; (2) evolution of biotic potential (r-selection organisms with high intrinsic birth rates (b sub max) or low death rates); and (3) reduced visibility, especially of larger adults. Examples from oligotrophic Lake Superior and mesotrophic lake Ontario are given to support these trends. Adaptation values yielded by a model predicted that the calanoid copepod Diaptomus, a nannoplankton specialist, would be successful in Lake Superior because of high ingestion rate at a low cell densities, and high ingestion efficiency at small cell sizes. Bosmina would not be successful due to low filtering capacity. In Lake Ontario the feeding generalist Bosmina was predicted successful because of ingestion efficiency on small and large cells alike, small size at maturity, and high intrinsic birth rate. Field data confirmed these predictions, but not those for Daphnia. (Lynch-Wisconsin)
W78-04761

THE DISTRIBUTION OF IRON IN A CLOSED ECOSYSTEM,
For primary bibliographic entry see Field 5B.
W78-04762

NUTRIENT KINETICS AND THE NEW TYPOLOGY,
F. H. Rigler.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol 19, p 197-210, October 1975. 2 fig, 44 ref.

Descriptors: *Nutrients, *Phosphorus, *Kinetics, *Classification, *Holism, *Reductionism, *Limnological theory, Typology, Cycling nutrients, History, Lakes, Limnology, Chlorophyll, Model studies, Theoretical analysis.

An analysis of two opposing limnological viewpoints--holistic and reductionistic--is followed by an evaluation of phosphorus kinetics studies. Holists deal with properties of the intact system, while reductionists study isolated components. Five schools of holists have arisen, and all still persist: (2) typology (c. 1910), a static, closed approach geared to constant lake properties; (2) correlation (c. 1925, which studies dynamic interactions between components; (3) experimental (c. 1940), in which one variable is artificially altered, and homeostasis and multiple interactions are emphasized; (4) kinetic (c. 1950), where nutrient cycling replaces the static approach; and (5) input-output (c. 1960), an open system stressing the importance of incoming nutrients, frequently using predictive models. Models assume a steady state and ignore complexities uncovered by the other schools, but provide a greatly simplified description of the lake. Holists and reductionists make diametrically opposed assumptions about the nature of lakes; holists differ among themselves primarily in selection of facts. The reductionist subdivides the whole into subsystems, which is valid only if there are no interactions among subsystems. Early experiments on phosphorus kinetics revealed inter- and intra-zonal fluxes; due to the complexity of the intact system, a shift toward reductionism occurred in the form of laboratory experiments with pure cultures. Recent work involving total phosphorus-chlorophyll correlation is proving more productive. (Lynch-Wisconsin)
W78-04763

EFFECT OF FUNGICIDE RATE, SPRAY INTERVAL; TIMING OF SPRAY APPLICATION, AND PRECIPITATION IN RELATION TO CONTROL OF PHYTOPHTHORA LEAF BLIGHT OF TARO,
Hawaii Univ., Honolulu. Dept. of Plant Pathology.
For primary bibliographic entry see Field 3C.
W78-04764

EXPERIMENTAL STUDIES ON THE STRESSING OF SUBMERGED FLOWING WATER MACROPHYTES, (IN GERMAN),
U. Glaenzer, W. Haber, and A. Kohler.
Arch Hydrobiol 79(2), p 193-232, 1977.

Descriptors: *Bioindicators, Chemicals, Submerged macrophytes, Water pollution effects, *Potamogeton coloratus, *Ranunculus fluitans.

Experiments were conducted in the laboratory and in the open air with submerged macrophytes exposed to different chemical influences. The individual reactions of the species were different. Potamogeton coloratus was seriously harmed while Ranunculus fluitans was nearly resistant. Other species reacted in an extremely sensitive manner to 1 chemical substance while not at all to others. Submerged macrophytes can apparently be used as indicators for the pollution of running water. Copyright 1978, Biological Abstracts, Inc.
W78-04765

LAKE EUTROPHICATION AND THE LIMITING CO2 CONCEPT: A SIMULATION STUDY,
J. R. Lehman, D. B. Botkin, and G. E. Likens.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol 19, p 300-307, October 1975. 6 fig, 1 tab, 17 ref.

Descriptors: *Eutrophication, *Lakes, *Carbon dioxide, *Limiting factors, *Simulation analysis, Phytoplankton, Model studies, Ontario(Canada), Seston, Nutrients, Carbon, Nitrogen, Phosphorus, Canada, Analytical techniques, Canadian Shield.

Simulation experiments for Experimental Lake 227 (northwestern Ontario), based on data given by Schindler (1971 b) were conducted, including a control run without artificial fertilization and a eutrophication run in which 10 micrograms PO4-P/l and 150 micrograms NO3-N/l were added weekly. A small chrysophyte was dominant at 10 million cells/l, and initial nutrient conditions were 2 micrograms PO4-P/l and 10 micrograms NO3-N/l in accordance with Schindler's findings. The simulation model predicts seston carbon concentrations of 600-750 micrograms/l before fertilization, and 3000-3500 after nutrient addition; for nitrogen the figures are 40-50 and 550-700, and for phosphorus 1-3 and 30-50. These concentrations are substantiated by actual data. The simulation indicates that nitrogen and phosphorus limit the standing crop at nutrient loading and carbon dioxide invasion rates measured in experimental lake 227, but dissolved inorganic carbon (DIC) concentrations affected plankton composition and species succession. Tripling of nutrient additions produced carbon limitation of phytoplankton standing crop, but the high nutrient loading rates and low carbon dioxide invasion rate necessary for such limitation would be unusual (though predictable) in nature. Data and simulation indicate that a form of interspecific competition, perhaps for dissolved carbon dioxide, rather than zooplankton grazing alone, is responsible for suppression of dominant chrysophytes in the fertilized lakes. (Lynch-Wisconsin)
W78-04766

CHEMICO-TROPHIC ATTRIBUTES OF DETRITAL AGGREGATES IN A NEW MEXICO ALKALINE RESERVOIR,
P. A. Buscemi, and J. H. Puffer.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol 19, p 358-366, October 1975. 10 fig, 1 tab, 12 ref.

Descriptors: Reservoirs, *Alkalinity, *Ute Reservoir(NM), *Zooplankton, *Detritus, Organic matter, *New Mexico, Alamogordo Reservoir(NM), Aggregates, Phytoplankton, Bosmina longirostris, Particulates, Trophic level.

Vertical water samples collected from alkaline Ute Reservoir, New Mexico, at subsurface, 6 m, and 15 m were analyzed for characteristics of detrital aggregates, and quantitative zooplankton samples were collected at one-meter intervals. It was concluded that: (1) dissolved organic matter may be concentrated as particulate organic matter in a recyclic process; and (2) such detrital aggregates constitute the principal, if not sole, nutrient source for some grazing zooplankton genera, when green algal populations are low. One such zooplankter is Bosmina longirostris. Chemical analysis of water samples taken from Ute and Alamogordo Reservoirs in September-October 1968 showed that bicarbonate and carbonate alkalinity were present (P=0-4 ppm; T=94-184 ppm), and SO4 and Ca(+) ions were unusually high (SO4, 214-330 ppm; Ca, 92-486 ppm). The pH of Ute Reservoir ranged from 7.6-8.0, and total residues were very high (811-1883 mg/l). The size range of detrital aggregates was 10-100 micrometers (average 40 micrometers). Calcium carbonate particles found in the aggregates had rounded shapes similar to those found in samples of atmospheric dust, suggesting that aggregate mineral nuclei are aeolian, and hence terrestrial, in origin. Particles of this kind are extremely numerous, ranging up to 105,000 particles/l, compared with 20,000 phytoplankton cells/l. (Lynch-Wisconsin)
W78-04767

PHOSPHORUS SUPPLY IN UNDISTURBED LAKES IN KEJIMKUJIK NATIONAL PARK, NOVA SCOTIA (CANADA),
J. Kerekes.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol 19, p 349-357, October 1975. 4 fig, 2 tab, 22 ref.

Descriptors: *Kejimkujik National Park(Canada), *Lakes, *Phosphorus, *Flushing rate, *Oligotrophy, Canada, Nutrients, Trophic levels, Bogs, Peat, Stratification, Chlorophyll, Model studies, Nova Scotia(Canada).

Surveys of 17 oligotrophic lakes in Kejimkujik National Park, Nova Scotia, Canada show that in undisturbed lakes total phosphorus and chlorophyll-a concentrations, greatly dependent on phosphorus availability, bear a curvilinear relationship to flushing rate. Total phosphorus begins to decline when the flushing rate exceeds an optimum of about seven times per year. Due to high flushing rates, some lakes had exceptionally high hydraulic loading of phosphorus, which would rank them high among eutrophic lakes on an ordinary phosphorus loading/mean depth model. The high flushing rate, however, prevents nutrient accumulation in the epilimnion, which retains an oligotrophic character, whereas the thermocline and hypolimnion act as a nutrient trap. Nutrient concentrations continue to increase with the advance of summer stratification. A modification of the phosphorus-loading/mean depth model is proposed which compensates for high hydraulic loading. Flushing rates of 1-418 times per year were observed in the 17 lakes. Very clear lakes (5 Hazen units) had low flushing rates and drainage basins lacked peat deposits. Highly colored lakes either have had flushing rates or were surrounded by bogs. Salinity in the lakes varied from 12-24 mg/l, mean total phosphorus from 5-10 mg P/cu m, and mean chlorophyll-a from 1-3 mg/cu m. In lakes with high flushing rates, hypolimnion total phosphorus in summer increased to 40-60 mg P/cu m. (Lynch-Wisconsin)
W78-04768

INTERSTITIAL WATER COMPONENTS AND EXCHANGE ACROSS THE WATER SEDIMENT INTERFACE OF WESTERN LAKE SUPERIOR,
G. E. Glass, and J. E. Poldoski.
Verh. Internat. Verein. Limnol., Vol 19, p 405-420, October 1975. 6 fig, 5 tab, 30 ref.

Descriptors: *Lake Superior, *Interstices, *Sediment-water interfaces, *Taconite, *Water pollution sources, Minnesota, Tailings, Iron ore, Water quality, Pollutants, Water pollution effects, Great Lakes, Industrial wastes, Beaver Bay(MN), Hovland(MN), Reserve Mining Company, Silver Bay(MN).

Two sampling cruises in western Lake Superior in July and September 1972 assessed effects on water quality of iron ore (taconite) tailings discharged at Silver Bay, Minnesota. The exchange of dissolved components between interstitial and overlying water from materials deposited on the lake bottom was also investigated. Two areas were sampled, one at Beaver Bay near the tailings discharge point, and one at Hovland (MN), a considerable distance upcurrent from Silver Bay. At Beaver Bay cummingtonite-grunerite was the major component of suspended solids and upper sediment layer; at Hovland levels were below detection (1%). Layer thickness at Beaver Bay ranged from 10 cm to 90 m. The tailings layer was much denser, coarser, and more porous than natural sediments. Manganese, potassium, suspended solids, and turbidity in the overlying water were all higher at Beaver Bay than at Hovland. Concentrations in sediment interstitial water were much higher than in the overlying water. Beaver Bay was higher than Hovland in silica, copper, manganese, calcium, and magnesium, but lower in phosphate. In the sediment, organic carbon and organic hydrogen were higher at Hovland. In 12 undisturbed core samples of overlying water and sediment, these changes were noted in the overlying water after 1600 hours: silica, calcium, magnesium, sodium, potassium, and manganese increased and oxygen decreased to 5 mg/l; copper, iron, and phosphorus showed little change. (Lynch-Wisconsin)
W78-04769

FLUX OF NUTRIENTS BY DIFFUSION THROUGH THE LAKE SEDIMENT-HYPOLIMNION INTERFACE FOR 9 LAKES IN MAINE, U.S.A.,
S. A. Norton, and D. R. Sasseville.
Verh. Internat. Verein. Limnol., Vol. 19, p 372-381, October 1975. 5 fig, 2 tab, 19 ref.

Descriptors: *Lakes, *Sediment-water interfaces, *Nutrient flux, *Trophic level, *Diffusion, *Maine, Sediments, Hypolimnion, Nutrients, Interstices, Cultural effects, Eutrophication, Oligotrophy.

Closely-spaced interstitial water samples from sediment cores plus overlying bottom water from nine lakes in Maine were studied to determine nutrient flux by diffusion through the sediment-water interface. Samples were analyzed for potassium, sodium, calcium, magnesium, iron, manganese, silica, and phosphorus. It was concluded that: (1) concentration gradients of the nutrients were considerably higher than previously reported, primarily due to finer resolution in this study; (2) a 'reactive' layer exists at or near the sediment surface with concentrations of some elements, especially phosphorus, higher than above or below this layer; (3) several cores from the profundal zone in the same lake were very similar; (4) profiles differed markedly from lake to lake; (5) diffusion coefficients appeared strongly related to water content; (6) diffusion contributed significant amounts of many species to bottom waters; and (7) diagenetic reactions were dominated by the solution of diatoms, followed by solution of iron and manganese; subaqueous weathering of silicate minerals contributed minor alkalies and alkali earths to the interstitial waters. Trophic levels of the lakes studied ranged from eutrophic Annabessacook Lake to oliogtrophic Moosehead Lake, and from very culturally developed to relatively undeveloped. All lakes had alkalinities of 5-30 ppm CaCO3. (Lynch-Wisconsin)
W78-04770

PRIMARY PRODUCTION IN FOUR SMALL LAKES IN THE CANADIAN ROCKY MOUNTAINS,
G. L. Fabris, and U. T. Hammer.
Verh. Internat. Verein. Limnol. Vol. 19, p 530-541, October 1975. 5 fig, 4 tab, 29 ref. National Research Council of Canada A-1412.

Descriptors: *Primary productivity, *Lakes, *Oligotrophy, *Phytoplankton, Rocky Mountain region, *Canada, Nannoplankton, Banff National Park(Canada), Altitude, Trophic levels, Water temperature.

Vertical and areal profiles of productivity for Herbert, Norman, Eiffel, and Helen Lakes in Banff National Park in the Rocky Mountains of western Canada showed that higher primary production rates were directly associated with higher water temperatures and higher total dissolved solids, and inversely with increasing altitude. Phytoplankton primary production rates were measured during the ice-free period of 1965 using the carbon-14 technique. The lakes varied in altitude from 1,615 m (Herbert Lake) to 2.320 m (Helen Lake), in depth from 1.75 m (Norman Lake), to 13.5 m (Eiffel Lake), and in area from 1.5 ha (Norman Lake) to 7.8 ha (Eiffel Lake). Water temperatures were lower in the higher-altitude lakes. Herbert and Helen Lakes are dimictic, with thermal stratification most notable in Herbert Lake, and much weaker in Helen Lake. Eiffel Lake, which may be a subpolar dimictic type, was characterized by poor thermal stratification. Norman Lake, as a perennial pond, stratified only during short periods in the open season. Areal primary production rates ranged from 9-601 mg C/sq m/day, while volumetric rates varied from 3.1-94.0 mg C/cu m/day. Annual production during the ice-free period varied from 2.5-48.5 g C/sq m. Maximum rate of carbon assimilation per unit volume varied from 1.5-5.8 mg C/cu m/hr. Various indices monitored indicate that these lakes tend to be oligotrophic. Comparisons of total phytoplankton and nannoplankton primary production rates were also made. (Lynch-Wisconsin)
W78-04771

PHOSPHORUS REMOVAL AND WATER QUALITY IMPROVEMENTS IN GRAVENHURST BAY, ONTARIO,
For primary bibliographic entry see Field 5D.
W78-04772

HYDROBIOLOGICAL STATE OF THE NADARBAZEVI RESERVOIR DURING THE FIRST YEARS OF ITS FILLING WITH FRESHWATER, (IN GEORGIAN),
For primary bibliographic entry see Field 2H.
W78-04773

COMPARATIVE INTERSTITIAL WATER AND SEDIMENT CHEMISTRY IN OLIGOTROPHIC AND MESOTROPHIC LAKES, MAINE, U.S.A.,
D. R. Sasseville, S. A. Norton, and R. B. Davis.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol. 19, p 367-371, October 1975. 4 fig, 1 tab, 6 ref.

Descriptors: *Lakes, *Oligotrophy, *Mesotrophy, *Sediments, *Agriculture, *Palynology, *Maine, Trophic levels, Interstices, Chemical analysis, Nutrients, Dating, Pollen, Sediment-water interfaces, Environmental effects, Cultural effects, Diffusion.

Samples of sediment and interstitial water from two oligotrophic lakes (Emden Pond, Tunk Lake) and tow mesotrophic lakes (China Lake, Fish River Lake) were analyzed chemically to assess effects of human cultural activities. Agriculture and construction of dwellings has been intense around Emden Pond and China Lake, while Tunk Lake and Fish River Lake were relatively undeveloped. Results showed a cultural impact upon sediment chemistry, but not all chemical components changed in the same manner. However, average core values for the biologically-important elements phosphorus and sulfur, as well as water content and organic matter, were highest in the two oligotrophic lakes. Vertical variations in sediment chemistry (K2O, MgO, phosphorus, and sulfur) were correlated with the presence of European man through dating of Ambrosia and Rumex pollen. Diffusion-controlled interstitial water chemistry profiles indicated movement of potassium, sodium, and silicon dioxide to or through the sediment-water interfaces. Profiles generally showed increasing concentrations of all parameters with depth. For silicon dioxide, levels increased steadily down to about 5 cm, where constant values of 20-45 ppm were attained. A pronounced 'reactive' layer with higher concentrations of dissolved species was present in all lakes at a depth of 1-5 cm, perhaps acting as a nutrient-supply reservoir for the overlying water. (Lynch-Wisconsin)
W78-04774

THE ABUNDANCE AND SIGNIFICANCE OF PHYTOFLAGELLATES AND NANNOPLANKTON IN THE ST. LAWRENCE GREAT LAKES, I. PHYTOFLAGELLATES,
M. Munawar, and I. F. Munawar.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol 19, p 705-723, October 1975. 6 fig, 4 tab, 20 ref.

Descriptors: *Phytoflagellates, *Great Lakes, *Plant populations, *Phytoplankton, *Sampling, *Laboratory techniques, *Data collections, Flagellates, Lake Erie, Lake Huron, Lake Superior, Lake Ontario, Biomass, Nannoplankton, Chrysomanadinae, Cryptomonadinae, Dinaphyeinae.

Sampling of 14 stations on Lakes Huron, Ontario, Erie, and Superior showed much higher phytoflagellate populations than reported in the past; this is due primarily to improved preservation, concentration, and enumeration techniques, in particular the Uttermohl inverted microscope procedure. Phytoflagellates were, in fact, found to dominate phytoplankton communities at both nearshore and offshore stations. Highest average percentages were in Lake Superior (over 70%), followed by Lake Ontario (over 50%), Lake Erie (23-47%), and Lake Huron (11-26%). Phytoflagellate percentage abundance was related to primary production rate and production/biomass quotients (activity coefficient). Phytoplankton biomass was higher at nearshore than offshore stations in Lakes Ontario and Huron, the reverse in Lake Erie, and about equal in Lake Superior. In lake Huron, phytoplankton biomass was 16 times greater at the nearshore Saginaw Bay station than at the offshore stations. Phytoflagellate populations were dominated by Chrysomonadinae, Cryptomonadinae, and Dinophycinae. Motile forms of Chlorophyta and Euglenophyta were observed sporadically, but were not abundant. In terms of biomass, the most important genera were Ochromonas, Dinobryon, Chrysochromulina, Cryptomonas, Katablepharis, Rhodomonas, Certium, Gymnodinium, and Peridinium. The nannoplankton species Cryptomonas erosa, Chrysochromulina parva, Rhodomonas minuta, and katablepharis ovalis were by far the most abundant numerically at all stations. (Lynch-Wisconsin)
W78-04775

A MALLOMONAS POPULATION,
Vaxtbiologiska Institutionen, Uppsala (Sweden).
K. Thomasson.
Svensk Botanisk Tidskrift, Vol 64, No 3, p 303-311, 1970. 2 fig, 2 tab, 19 ref.

Descriptors: *Mallomonas, *Phytoplankton, *Lilla Hastastjarn(Sweden), *Dystrophy, *Algae, Sweden, Lakes, Mallomonas fastigiata, Oligotrophy, Color, Data collection methods.

A water sample taken from Lilla hastastjarn, a small dystrophic body of water in Varmland, Sweden. In August 1963 proved an almost pure culture of the phytoplanktonic genus Mallomonas (Chrysophyceae). The majority of the population was Mallomonas fastigiata, followed by M. acaroides v. crassisquama. M. fastigiata is generally confused with M. caudata in the literature. Lilla Hastastjarn, which is stained brown, is located in an oligotrophic area; comparative chemical data are given for Lilla Hastastjarn and the nearby lakes L. Horrsjon, S. Horrsjon, and Yngen. Alkalinity (HC03) was 0, 0.019, 0.012, and 0.299 respectively; pH was 5.6, 6.2, 5.9, and 7.4; conductivity was 20, 21, 22, and 47; and color (mg Pt/l) was 35, 40, 20, and 5. A planktonic checklist is given for Lilla Hastastjarn for five years (1964-68). Two interesting benthic species present are seldom reported for Swedish waters, the epiphytic diatom Actinella punctata, and the metaphytic desmid Docidium undulatum. The data on Mallomonas indicate that some of the more heavily-studied lakes in the region should be re-examined in terms of better identification of their algal flora through high-power microscopy. (Lynch-Wisconsin)
W78-04776

ACTINOTAENIUM COSMARIUM AND STAURODESMUS IN THE PLANKTON OF ROTORUA LAKES,
Vaxbiologiska Institutionen, Uppsala (Sweden).
K. Thomasson.
Svensk Botanisk Tidskrift, Vol 67, p 127-141, 1973. 6 fig, 24 ref.

Descriptors: *Rotorua(New Zealand), *Desmids, *Actinotaenium, *Cosmarium, *Staurodesmus, *Phytoplankton, Lakes, New Zealand, North Island(New Zealand), Monomictic lakes, Water temperature, Distribution, Classification, Algae.

Phytoplankton of the warm, monomictic lakes in the Rotorua district on the North Island of New Zealand are rich in desmids, including members of the cosmopolitan genera Actinotaenium, Cosmarium, and Staurodesmus. Most of these desmids are also common in northern hemisphere lakes. The high frequency of dividing cells is notable, indicative of a favorable environment. The following taxa are discussed in this paper, based on collections made in March 1968: Actinotaenium diplosporum, A. globosum, A. turgidum; Cosmarium amplum, C. bioculatum, C. contractum, C. contractum v. ellipsoideum, C. contractum v. minutum, C. contractum v. retusum, C. lundellii v. corruptum, C. lundelliiv. ellipticum, C. melanosporum, C. melanosporum, C. monochondrum v. fallax, C. perfissum, C. pseudarctoum, C. reniforme; Staurodesmus convergens v. laportei, S. cuspidatus v. curvatus, S. glaber, S. glaber v. limnophilus, S. leptodermus v. subcorniculatus, S. megacanthus, S. megacanthus v. orientalis, S. mucronatus v. parallelus, S. pachyrhynchus, S. pachyrhynchys v. pseudopachyrhynchus, s. pachyrhynchus v. tenerus, S. phimus, S. spetsbergensis, S. spetsbergensis v. limneticus, S. trangularis, and S. unicornis v. gracilis. (Lynch-Wisconsin)
W78-04777

HETEROTROPHIC UTILIZATION OF PHYTOPLANKTON METABOLITES BY THE MICROBIOTA OF SUNFISH LAKE, ONTARIO,
D. T. Waite, and H. C. Duthie.
Verhandlungen, Internationale Vereinigung fuer Theoretische und Angewandte Limnologie, Vol 19, p 672-681, October 1975. 2 fig, 4 tab, 27 ref.

Descriptors: *Sunfish Lake(Ontario Canada), *Phytoplankton, *Metabolites, *Food chains, *Detritus, Canada, Heterotrophy, Algae, Ecosystems, Food webs, Photosynthesis, Bacteria, Zooplankton.

Acceptability of three types of phytoplankton metabolities as nutrient sources for microbiota in Sunfish Lake (Ontario, Canada) was examined. Metabolities were typed as: (1) extracellular products, released as waste or by-products of photosynthesis (phototrophic zone); (2) water-soluble compounds, which contribute to the dissolved organic material pool upon cell lysis and leaching (Phototrophic and tropholytic zones); and (3) water-insoluble materials, forming part of the precipitationg particulate material in the lake; these could provide food for benthic organisms and zooplankton. It was concluded that: (1) extracellular products are not utilized by lake microbiota; no significant difference was found between gross and new estimated extracellular production; (2) water-soluble metabolities are readily utilized by bacteria and algae under certain circumstances; and (3) water-insoluble metabolities, which occur at all lake depths, generally appear to be utilized only in the warm aerobic epilimnion by bacteria. Sunfish Lake is a small meromictic lake in southern Ontario, with a surface area of 8.3 ha and a maximum depth of 20 m. For the experiments, axenic unialgal cultures of Anacystis nidulans, Chlamydomonas angulosa, and Navicula pelliculosa were treated with carbon-14, and radioactive metabolities were combined with water samples from Sunfish Lake. (Lynch-Wisconsin)
W78-04778

CHEMICALS USED TO CONTROL FISH AND AQUATIC PLANTS IN ILLINOIS, I. AN EVALUATION OF FISH TOXICANTS.
Illinois Natural History Survey, Urbana. Aquatic Biology Section.
For primary bibliographic entry see Field 5G.
W78-04779

CHEMICALS USED TO CONTROL FISH AND AQUATIC PLANTS IN ILLINOIS, A REVIEW OF THE AQUATIC HERBICIDES USED IN ILLINOIS,
Illinois Natural History Survey, Urbana. Aquatic Biology Section.
For primary bibliographic entry see Field 5G.
W78-04780

BIOLOGICAL SURVEY OF PINKHAM CREEK AND THE NORTH PLATTE RIVER IN THE VICINITY OF COWDREY, COLORADO, AUGUST 24, 1972,
Environmental Protection Agency, Denver, CO. Surveillance and Analysis Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 955, Price codes: A02 in paper copy, A01 in microfiche. EPA Report S and A/TSB-11, November 1972. 9 p, 1 fig, 2 tab, 1 append. S and A/TSB-11.

Descriptors: *Pinkham Creek(CO), *North Platte River(CO), *Suspended solids, *Water pollution effects, *Benthic fauna, Rivers, Mine wastes, Effluents, Waste water disposal, Industrial wastes, Insects, Stoneflies, Mayflies, Caddisflies.

A survey of benthic fauna in Pinkham Creek and at its confluence with the North Platte River near Cowdrey, Colorado, Following an industrial discharge of suspended solids into the creek, indicated few negative effects. The Ozark-Mohoning Company, a fluorspar mining and processing company, discharged the suspended solids into the creek about four miles above the confluence point

on June 18, 1972. Samples collected at the same time indicated total solids of about 1600 mg/l just downstream, compared with 224 mg/l upstream. The biological survey was conducted on August 24, 1972; at the upstream Pinkham Creek station 19 taxa were collected, with a density of 60/sq ft. Composed predominantly of stoneflies and mayfloes, the community was indicative of a clean-water environmental. No significant change was observed at the downstream station, except for a small decrease in diversity (11) and density (52/sq ft). Pollution-sensitive stoneflies and mayflies again were dominant. A black band around most rocks was the only possible evidence of pollution. In the North Platte, the station upstream from the Pinkham Creek confluence comprised 22 taxa with a density of 407/sq ft, dominated by caddisflies at 370/sq ft. Mayflies and stoneflies were also present. Downstream, 18 taxa with a density of 57/sq ft were recorded: a significant decline in caddisflies reflected incomplete recolonization following stream recovery from the mining discharge. (Lynch-Wisconsin)
W78-04781

BACTERIOLOGICAL INVESTIGATIONS OF THE UPPER SOUTH PLATTE RIVER BASIN. MAY 1972, JULY 1972, SEPTEMBER 1972,
Environmental Protection Agency, Denver, CO. Surveillance and Analysis Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 949, Price codes: A04 in paper copy, A01 in microfiche. EPA Report S and A-TSB-6, December 1972, 46 p, 12 fig, 6 tab, 3 ref, 2 append. S and A-TSB-6.

Descriptors: *Bacteria, *Coliforms, *South Platte River(CO), *Swimming, *Water pollution control, *Water quality standards, Rivers, Recreation, Water sports, Denver(CO), Colorado, Pollution abatement, Storm runoff.

Bacteriological surveys were carried out in mid-1972 to determine wherther present fecal and total coliform levels in the South Platte River above Denver, Colorado, comply with standards required for a proposed B3 reclassification to permit body contact water recreation (swimming and inner-tube floating). Fecal coliforms exceeded the Class B3 standards at one of four stations in May, four of 19 stations in July, and one of seven in September. Total coliforms were exceeded at no stations in May, one of 19 in July, and one of seven in September. Violations, attribiuted to storm runoff, can be eliminated, except during major runoff periods, by: (1) controlling the periodic discharge from the Centennial Racetrack horse barns by diversion into a leaching pond; and (2) construction of a settling pond for removal of suspended solids from wastewater from the Kassler Water Treatment Plant filter sand-washing operation. The proposed reclassification area extends from Union Avenue in Littleton, Colorado, to Waterton, Colorado. Class B3 standards require total coliform density not to exceed 1000/100 ml average per month, nor to exceed this figure in 20% of samples; the single sample maximum is 2400/100 ml. Fecal coliforms shall not exceed 100/100 ml, and fecal streptococcus shall not exceed 20/100 ml; both are monthly sample averages. Bear Creek, which joins the South Platte downstream of the study area, was also sampled. (Lynch-Wisconsin)
W78-04782

THE EDGE OF THE ARROWHEAD,
Minnesota Marine Advisory Service, Duluth. Office of Sea Grant.
For primary bibliographic entry see Field 2H.
W78-04784

EFFECTS OF ENVIRONMENTAL CHANGES ON MARSH VEGETATION WITH SPECIAL REFERENCE TO SALINITY,
Tulane Univ., New Orleans, LA.
A. E. Smalley, and L. B. Thien.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-22616, Price codes: A06 in paper copy, A01 in microfiche. Report NASA-CR-147585, February 1976. 14 fig, 26 tab, 135 ref. NAS-9-14501.

Descriptors: *Marsh plants, *Salinity, *Louisiana, *Species composition, *Succession, Marshes, Tidal marshes, Wetlands, Mississippi River, Reviews, Bibliographies, Bayous, Seasonal, Bayou Terre aux Boeufs(LA).

A one-year study was conducted in 1975 and early 1976 to determine the relationship of salinity to seasonal composition variation in five Louisiana tidal marshes. The study area is located along Bayou Terre aux Boeufs in the sub-delta marshes of southeastern Louisiana, and included Pertain Lagoon, Bayou Gaudet, Bottle Lagoon, Dead Duck Pass, and Drum Bay. These marshes are inactive delta formations with saline mineral deposits of marine origin. Salinity regimes were established on the basis of peak soil salinity (PSS). At a PSS of 10 ppt or less, as in Petan Lagoon and Bayou Gaudet, Spartina patens occurs as the dominant species or in pure stands; the vegetation of Petain Lagoon is succeeding in favor of pure S. patens. At PSS levels of 10-20 pt (e.g., Bottle Lagoon) the dominant species throughout the year is Distichlis spicata; also important are Spartina alterniflora and S. patens, with Juncus roemerianus present to a lesser degree. With PSS levels at 15-25 ppt, as at Dead Duck Pass, J. roemerianus dominates, followed by S. alterniflora; S. patens and D. spicata are minor. Areas with high PSS (>20ppt) and regular flooding, as in Drum Bay, are characterized almost totally by S. alterniflora communities. Species composition is the most stable during April to mid-July. An extensive literature review and bibliography is included. (Lynch-Wisconsin)
W78-04785

THE CONTRIBUTION OF AGRICULTURE TO THE EUTROPHICATION OF SWISS WATERS, I. RESULTS OF DIRECT MEASUREMENTS IN THE DRAINAGE AREA OF VARIOUS CHANNELS,
R. Gachter, and O. J. Furrer.
Available from the National Technical Information Service, Springfield, VA 22161 as N75-30641, Price codes: A03 in paper copy, A01 in microfiche. Translation No. 1809, p 1-34, 1975, 12 fig, 17 tab, 19 ref. Translated from Schweizerische Zeitchrift fur Hydrologie, Vol. 34, No. 1, p 41-70, 1972.

Descriptors: *Switzerland, *Lakes, *Drainage area, *Eutrophication, *Agricultural runoff, Nonpoint pollution, Agriculture, Nutrients, Phosphorus, Nitrogen, Trophic levels, Limiting factors, Waste water treatment, Watersheds(Basins).

Relative nutrient contributions from agriculture were estimated from a review of results from seven studies of drainage areas of several Swiss lakes and rivers. From areas used for agriculture only, phosphorus inputs were 69 kg/sq km/yr for the lower alpine region, and 35 kg for the lowlands; nitrogen inputs were 1634 and 2102 kg/sq km/yr respectively. From areas used only for forestry, phosphorus inputs were 0.4 and 0.1 kg/sq km/yr for the two regions, and nitrogen inputs were 82 and 959 kg/sq km/yr. In Swiss lakes algal growth is generally phosphorus limited, but sometimes also nitrogen limited. Nutrients enter the lake from the atmosphere, soils, and wastewater. Higher nitrogen concentrations in lowland soils are apparently due to more intensive microbiological mobilization, and increased use of nitrogenous fertilizers. Agricultural nutrient contributions to the lakes depend on cultivation methods, population density, and effectiveness of wastewater treatment. In Switzerland probably more than 70% of the nitrogen discharged into lakes originates from soils in the drainage area, compared with less than 50% of the phosphorus. With balanced growth, algae assimilate nitrogen and phosphorus in a weight ratio of about 7:1. In lower alpine lakes the N:P ratio was about 30, and in lowland lakes about 80. Drainage areas studied were for Lakes Alpnach, Sarner, Hallwiler, Murten, Pfaffik, and Greifen, and the Rivers Linth and Limmat. (Lynch-Wisconsin)
W78-04786

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970, INTRODUCTION,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
M. Waern.
OIKOS Supplementum, Vol. 15, 1973. p 153-194, 29 fig, 3 tab, 60 ref.

Descriptors: *Nutrients, *Stockholm Archipelago(Sweden), *Lake Malaren(Sweden), *Algae, *Eutrophication, *Water pollution effecs, *Sewage disposal, Norrstrom River(Sweden), Saline water-freshwater interfaces, Baltic Sea, Indicators, Phosphorus, Nitrogen, Lakes, Phytoplankton, Limiting factors.

This collection of seven papers describes 1970 studies of effects of sewage discharges from the city of Stockholm, Sweden, into adjacent Lake Malaren and the Stockholm Archipelago. The present investigation began in 1967, following pilot projects from 1963-67 which dealt with pollution distribution in the form of total phosphorus, transparency, and benthic algae. The present study focuses on primary effects of the nutrients inputs (i.e., on algal growth), while parallel investigations conducted by the city of Stockholm have studied secondary effects, including oxygen conditions, total phosphorus, and PO4-P in deeper water. Sewage discharged into freshwater Lake Malaren is carried by the Norrstrom River into the brackish archipelago in the Baltic Sea, creating nutrient enrichment and algal blooms. These papers deal with: (1) rates of discharge of Lake Malaren into the Stockholm Archipelago and nutrient levels; (2) phosphate, nitrate, and ammonium in the archipelago; (3) a method for determining total phosphorus; (4) phytoplankton distribution in the archipelago as measured by chlorophyll-a; (5) a zone of abnormal Cladophora glomerata growth near Stockholm; (6) effects of sewage on the growth and distribution of Chara aspera and Fucus vesiculosus; and (7) limiting factors for Oscillatoria agardhii and Aphanizomenon flos-aquae. (Lynch-Wisconsin)
W78-04787

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 1, OUTFLOW STUDIES,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
M. Waern, and S. Pekkari.
OIKOS Supplementum, Vol. 15, p 155-163, 1973. 9 fig, 7 ref.

Descriptors: *Stockholm Archipelago(Sweden), *Nutrients, *Phosphorus, *Discharge(Water), *Lake Malaren(Sweden), Baltic Sea, Saline water-freshwater interfaces, Indicators, Lakes, Sewage disposal, Water pollution.

Discharge rates from Lake Malaren, near Stockholm, Sweden, into the Stockholm Archipelago in the Baltic Sea were monitored in 1969-70. The lake, which receives Stockholm's domestic treated sewage effluent, is discharged by the Norrstrom River into the sea. A halocline at 6-10 m separates outflowing surface water (salinity 1%-4%) from inflowing cold deep water (1-5C, 30-50 m deep, salinity 5%). With an average of 170 cu m/sec (5,360 million cu m/year), the discharge from Lake Malaren is greatest along the Swedish Baltic coast south of the Gulf of Bothnia. 1969 was characterized by a warm and dry summer, a winter discharge, a spring flood, and a very small discharge of 1-2 million cu m/day in summer and fall which resulted in sewage accumulation in the

archipelago near Stockholm. Phosphorus content was 350e400 micrograms/ l at its maximum in late autumn of 1969. A small discharge the following winter spread sewage outwards under the ice, but the brief but vigorous spring flood of 1970 ultimately carried the accumulation to more remote parts of the archipelago. Daily water levels and discharge rates are given for the lake and archipelago for the two years, and a series of maps shows phosphorus and nitrogen concentrations. (Lynch-Wisconsin)
W78-04788

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 2, PHOSPHATE, NITRATE AND AMMONIUM IN THE ARCHIPELAGO DURING 1970,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
M. Waern, and L. Hubinette.
OIKOS Supplementum, Vol. 15, p 164-170, 1973. 1 tab, 1 fig, 13 ref.

Descriptors: *Stockholm Archipelago(Sweden), *Phosphates, *Nitrates, *Ammonium compounds, *Nutrients, Algae, Lake Malaren(Sweden), Baltic Sea, Oscillatoria, Eutrophication, Sewage disposal, Saline water-freshwater interfaces, Lakes, Water pollution sources.

The spatial and temporal distribution of inorganic nitrogen and phosphorus is surface waters in the vicinity of Stockholm, Sweden is described. Water samples were collected from a research vessel between February-December 1970. Lake Malaren, a freshwater lake rich in nitrate-nitrogen, is discharged into the brackish Stockholm Archipelago in the Baltic Sea, which has a shortage of nitrate for assimilation. Disregarding Stockholm sewage effluent, total phosphorus in the lake (720 micrograms/l) is twice that in the sea, and total nitrogen (700 micrograms/l) is three times the level in the sea. Following the spring flood, sewage phosphate from Stockholm acts as a nitrate trap. Algae may nearly exhaust the nitrate in the lake, while in the archipelago a heavy Oscillatoria bloom creates a zone of high excess phosphate. The 1970 spring flood discharged 2,600 million cu m of freshwater from Lake Malaren, with a nitrate-nitrogen concentration of about 300 micrograms/l; freshwater nitrate extended far out into the archipelago and was an important contribution to the diatom bloom in spring. The transport of treated sewage was reflected in high April ammonium concentrations, with a maximum at Solofjarden, 25 km east of Stockholm. An extensive table giving the results of the monitoring effort is included. (Lynch-Wisconsin)
W78-04789

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 4, PHYTOPLANKTON DISTRIBUTION IN THE ARCHIPELAGO MEASURED AS CHLOROPHYLL A,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 5B.
W78-04791

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 5, THE ZONE OF ALGAL LOW STANDING CROP NEAR STOCKHOLM,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
L. Norin, and M. Waern.
OIKOS Supplementum, Vol. 15, p 179-184, 1973. 6 fig, 16 ref.

Descriptors: *Algae, *Cladophora glomerata, *Stockholm Archipelago(Sweden), *Water pollution effects, *Lake Malaren(Sweden), Standing crops, Baltic Sea, Lakes, Nutrients, Toxicity, Nitrogen, Sewage disposal, Ammonium compounds.

Experiments to determine causes of changes in growth patterns of the alga Cladophora glomerata near Stockholm, Sweden showed that the observed stubby growth and dark green color were positively correlated with polluted water. It had been noted that C. glomerata growing near the shores of Stockholm, both in freshwater Lake Malaren and brackish Stockholm Archipelago in the Baltic Sea, grew in small dark-green tufts, compared to much larger lighter-green plants further from the shore. Sewage from Stockholm is discharged into the lake, which is carried by the Norrstrom River into the archipelago. Widening of this zone of dwarfed dark-green plants during summer corresponds to the accumulation of polluted water beginning when spring outflow ceases and when very little water flows through the river. It was not determined which factors in the polluted water are responsible for the phenomenon, but heavy nitrogen fertilization may be important, especially combined with an excess of ammonium. Plants transferred between zones in each water body, and between fresh and brackish water, confirmed that the effects are environmental rather than genetic. Heavy metal toxicity could account for the changed appearance of the plant, but no significant pattern has yet been found. The dwarfism could result from rapid ripening followed by zoospore formation. (Lynch-Wisconsin)
W78-04792

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 6, EFFECTS OF SEWAGE WATER ON BENTHIC VEGETATION,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
S. Pekkari.
OIKOS Supplementum, Vol. 15, p 185-188, 1973. 3 fig, 8 ref.

Descriptors: *Sewage disposal, *Water pollution effects, *Chara aspera, *Fucus vesiculosus, *Gulf of Bothnia, *Stockholm Archipelage(Sweden), Benthic flora, Saline water-freshwater interfaces, Baltic Sea, Brahestad(Finland), Finland.

Effects of sewage water on the benthic plants Chara aspera and Fucus vesiculosus in the Stockholm Archipelago of Sweden and in the Gulf of Bothnia (Baltic Sea) were investigated. Chara aspera is a common plant in parts of the Baltic Sea with almost fresh water, for example the innermost part of the Gulf of Bothnia and in the Tvarminne area in southwestern Finland. Normal plants are found in the Stockholm Archipelago 50 km from Stockholm, but in the inner waters, polluted by sewage, thay have disappeared. In a zone 25-30 km from Stockholm plants range from very reduced in size (at 25 km) to abnormal specimens with naked, elongated branchlets and cortex only at the base of the stem (25-30 km offshore). The marine plant Fucus vesiculosus has been found in various freshwater enclaves, including in shallow water of the harbor of Oregrund and near Brahestad (Finland) in the northern end of the Gulf of Bothnia. Its occurrence intermingled with freshwater vegetation is thought to be the result of sewage effluents from the towns. Total phosphorus near the sewage discharge of Brahestad was 24.5 micrograms/l in August 1968, compared with 7.7 micrograms/l in the outer part of the archipelago. Salinity values were 2.80% and 2.83% respectively. (Lynch-Wisconsin)
W78-04793

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 7, ALGAL BIOTEST OF STOCKHOLM ARCHIPELAGO WATERS - QUALITATIVE ASPECTS,
Lantbrukshogskolan, Uppsala (Sweden). Institutionen for Vaxtfysiologi.
K. E. R. Melin, and P. E. B. Lindahl.
OIKOS Supplementum, Vol. 15, p 189-194, 1973. 6 fig, 8 ref.

Descriptors: *Algae, *Limiting factors, *Oscillatoria agardhii, *Aphanizomenon flos-aquae, *Nutrients, Cyanophyta, Trace elements, Stockholm Archipelago(Sweden), Lake Malaren(Sweden), Phosphates, Nitrates, Nitrogen fixation, Eutrophication, Phytoplankton.

Certain nutrients were added to water samples taken from the Stockholm Archipelago and Lake Malaren, Sweden, to determine chemical limiting factors for the Cyanophyta Oscillatoria agardhii and Aphanizomenon flos-aquae. Inoculations from cultures of the algae were added to water samples enriched with various combinations of phosphate, nitrate, and chelated trace elements. The latter included iron, zinc, manganese, cobalt, copper, boron, and molybdenum, with Na3-versenol as chelator. O. agardhii was stimulated by addition of nitrate alone or combined with chelated trace elements where water samples had a natural 10:1 ratio of nitrogen directly available to algae and phosphate-phosphorus. At a ratio of 100:1, addition of phosphate combined with chelated trace elements stimulated O. agardhii. A. flos-aquae, which is probably able to fix molecular nitrogen, was stimulated by the addition of phosphate, chelated trace elements, or a combination. In five samples where O. agardhii responded to nitrogen or nitrogen plus trace elements, A. flos-aquae responded to nitrogen in only one case, probably due to its apparent nitrogen-fixing ability. Both algae were stimulated by the addition of trace elements, alone or in combination with phosphorus or nitrogen, in about half the surface water samples. (Lynch-Wisconsin)
W78-04794

INFLUENCE OF CYMOTHOIDAE (CRUSTACEA, ISOPODA, FLABELLIFERA) ON SOME HERMATOLOGICAL CONSTANTS OF THE HOST FISHES, (IN FRENCH),
Monpellier-2 Univ. (France). Lab. Physiology Invertebres.
B. Romestand, and J.-P. Trilles.
Z Parasitenkd 52(1), p 91-96, 1977.

Descriptors: Crustaceans, *Cymothoidae, Host fishes, *Hermatological constants, *Fish parasites, Anilocra-physodes, Boops-boops, Emetha-audouini, Maena-maena, Meinertia-oestroides, Pagellus-erythrinus.

Some hematological constants (number of erythrocytes-Hb rate-hematocrit-mean blood corpuscule volume-mean corpuscular Hb concentration-mean corpuscular Hb) were studied in nonparasitized and parasitized telost fishes (Boops boops, Maena maena, Pagellus eythrinus). The parasites are cymothoid isopods (Meinertia oestroides, Anilocra physodes, Emetha audouini). The parasitized fishes are anemic, resulting from a decreasing number of erythrocytes in circulation. The spleen undergoes hypertrophy and hypervascularization.--Copyright 1978, Biological Abstracts, Inc.
W78-04801

PROBLEMS RELATED TO WATER QUALITY AND ALGAL CONTROL IN LOPEZ RESERVOIR, SAN LUIS OBISPO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA.
For primary bibliographic entry see Field 5G.
W78-04802

A MODELING APPROACH FOR PREDICTING NUTRIENT INFLUENCES ON LAKES AND THEIR WATERSHEDS,
Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.
S. A. Bucci, C. A. Carlozzi, and G. B. Oakland.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 312, Price codes: A03 in paper copy, A01 in microfiche.
Massachusetts Water Resources Research Center,

Amherst, Publication No. 81, August 1976. 32 p, 2 fig, 2 tab, 45 ref. OWRT A-071-MASS(1), 14-31-0001-5021.

Descriptors: Management, Lakes, Ecosystems, New York, *Model studies, Watersheds(Basins), *Nutrients, Mathematical models, Statistical models, Water pollution effects, Hydrological data, Dissolved solids, Chlorophyll, Phytoplankton, Chemicals, *Oneida Lake(NY).

Effective implementation of environmental management programs is hindered by an incomplete understanding of complex ecosystems and by insufficient analytical procedures to apply existing knowledge to real problems. With ecological information in a more tractable form, a resource manager will be able to elicit the important descriptor variables for the system (s)he administers. From these system descriptors, one can establish which variables can be manipulated physically, politically, and economically; and then incorporate the revised set of indicators into a unified management scheme. A model was developed for Oneida Lake, New York, which focused on the interchange among a number of dissolved chemical substances and chlorophyll a between October 1967 and August 1968. Various multivariate statistical techniques were used to analyze the nutrient effects on phytoplankton response. The resulting mathematical equation is an unbiased model for the lake system which reflects the interacting nature of its components and which has predictive capabilities. This modeling approach illustrates a procedure for incorporating the effect of variable interactions into a system's model and for eliciting key chemical descriptors in any lake system. It yields a usable, analytical tool for evaluating the present status of a lake and for predicting its future condition. (Lefferts-Mass)
W78-04814

ORGANIC CARBON AND DEOXYGENATION IN THE PAMLICO RIVER ESTUARY,
East Carolina Univ., Greenville, SC. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W78-04816

EFFECT OF SPRAY IRRIGATION OF MUNICIPAL WASTEWATER ON SOIL INVERTEBRATE POPULATIONS AND THE POTENTIAL INFLUENCE ON PHYSICAL FACTORS OF SOIL,
State Univ. of New York Coll. of Environmental Science and Forestry. Dept. of Environmental and Forestry Biology.
D. L. Dindal.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 355, Price codes: A03 in paper copy, A01 in microfiche. Center for Environmental Research, Cornell University, Ithaca, New York. Completion Report, December 1977. 26 p, 3 fig, 4 tab, 14 ref. OWRT B-048-NY(1). 14-31-0001-5130.

Descriptors: *Municipal wastewater irrigation, *Soil microarthropods, Earthworms, *Terrestrial invertebrate communities, Species diversity, Population dynamics, *Soil physical factors, Heavy metals, Waste water disposal, Water pollution effects.

Soil invertebrate samples were collected for three years from four effluent treated and untreated sites at The Pennsylvania State University. In general, the species diversity and populations of most soil microarthropods decreased on irrigated sites. This group of soil organisms is comprised of fungivores such as collembolans and oribatid mites, predators and fungivores represented by the prostigmatid mites and predaceous mesostigmatid mites. One taxon of mites, the fungivorous astigmatids, remained unchanged by treatment. This finding is important in irrigation studies since population increases in astigmatids on a site are indicative of anaerobic conditions. Total numbers and biomass of earthworms increased with treatment. Wastewater applications selected against two species and selected for seven species of earthworms. The latter is most dramatically seen on a mixed oak area where earthworms increased from zero on the control to 600 per square meter in treated stands. Earthworms on treated sites have no effect on soil bulk density changes, whereas, a direct relationship exists between worm biomass and soil porosity. Formation of specific sized water stable soil aggregates appears to be related to presence and population increases of specific species of earthworms. Although there is no gross trace metal uptake by earthworms and no heavy metal toxicity occurring as a result of irrigation, different earthworm types and life stages accumulate Cu, Zn and Cd in species specific concentrations.
W78-04818

RADIOECOLOGY,
Halsted Pres, division of John Wiley and Sons: New York, N. Y. Isreal Program for Scientific Translations: Jerusalem, Isreal, 1973. 371p. Klechkovskii, V.M., Polikarpov, G.G., Aleksakhin, R.M. (Ed.).

Descriptors: *Radioecology, Radioactivity, Dosimetry, Ecology, Fallout, Fish, Food chains, Forests, Genetics, Soils, Radioisotopes.

Described are: the behavior of natural radionuclides in soils; the behavior of artificial radionuclides in the atmosphere, their fallout and distribution on the earth's surface; aspects of the contamination of the soil-plant cover treatment of the behavior of radionuclides in soils; the peculiar behavior of radionuclides in forest stands; radioation conditions in the human environment and the effect of ionizing radiation on populations and cenoses with respect to radiation genetics. Other sections discuss some stuidies and aims of futher research concerned with the effect of oinizing radiation on forest biogenocenoses; dosimetric aspects of radioecology; migration of artificial radionuclides in biological and food chains with the participation of wild and farm animals; some aspects of the effect of ionizing radiation on animals; and various radioecological aspects of Far North landscapes. The radioecology of marine and freshwater plants and animals are studied as are various aspects of radionuclide migration in seas and oceans, including the part played by the form of radionuclides in water during their migraton in the aquatic environment and the buildup of artificial radionuclides in fish. Ten talbes and 58 figures (6 in color) are included throughout; each contribution ends with a detailed list of references. The book was translated from the Russian version published in 1971.--Copyright, 1974, Biological Abstracts Inc.
W78-04820

A NEW METHOD OF MONITORING WATER QUALITY IN A STREAM RECEIVING SEWAGE EFFLUENT, USING CHIRONOMID PUPAL EXUVIAE,
Bristol Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W78-04880

FACTORS AFFECTING MICRODISTRIBUTION OF STREAM BENTHIC INSECTS,
Idaho State Univ., Pocatello. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W78-04881

CONCENTRATION OF CADMIUM IN AQUATIC PLANTS AND ALGAL MASS IN FLOODED RICE CULTURE,
European Atomic Energy Community, Ispra (Italy). Biology Div.
P. Reiniger.
Environmental Pollution, Vol. 14, 1977, p 297-311. 3 tab, 6 ref.

Descriptors: *Cadmium, *Heavy metals, Water pollution effects, *Aquatic plants, *Aquatic soil, Aquatic algae, Aquatic weed, *Rice, On-site-investigations, Water pollution, Water treatment, *Flooded rice soil, Bioaccumulation, Waste accumulation.

Concentrations of Cd in aquatic plants on a flooded rice soil contaminated with Cd, largely exceeded cadmium concentrations found in leaves and roots of rice plants. The accumulation of Cd by the algal mass was considerable, with a concentration factor of around 10,000 relative to the surface water. The quantity of Cd accumulated by the algal mass in a rice field may be comparable to that in the leaves of the rice plants. (Katz)
W78-04885

INHIBITED HATCHING SUCCESS OF MARINE FISH EGGS BY POWER PLANT EFFLUENT,
Occidental Coll., Los Angeles, CA. Dept. of Biology.
K. E. Ehrlich.
Marine Pollution Bulletin, Vol. 8, No. 10, 1977, p 228-229. 1 tab, 5 ref.

Descriptors: *Thermal power plant, *Fish eggs, *Aquiculture, Water pollution effects, Fish physiology, *Fish reproduction, On-site-investigation, Laboratory tests, California, Marine fish, Cooling water, *Electric power, Effluents, *California Grunion, Leuresthes tenuis, Nonthermal component, Hatching success.

The hatching success of California grunion (Leuresthes tenuis) was significantly reduced by a non-thermal component of the effluent from an electricity generating station. The embryos appeared to develop normally morphologically but showed reduced viability with respect to hatching. (Katz)
W78-04886

TRACE METALS IN SCALLOPS FROM WITHIN AND AROUND TWO OCEAN DISPOSAL SITES,
Environmental Protection Agency, Narragansett, RI.
G. Pesch, B. Reynolds, and P. Rogerson.
Marine Pollution Bulletin, Vol. 8, No. 10, 1977, p 224-228. 2 tab, 6 fig, 13 ref.

Descriptors: *Metals, Water pollution effects, Delaware, New Jersey, Marine, Waste disposal, *Silver, *Aluminum, *Cadmium, *Cobalt, *Chromium, *Copper, *Iron, *Manganese, *Nickel, *Lead, *Zinc, *Titanium, Atlantic Ocean, Toxicity, Path of pollutants, Currents(Water), *Vanadium, Scallops, *Sea scallop tissues, *Metal distribution.

The areal distributions of the concentrations of 13 metals in sea scallop tissues were examined in the vicinity of two ocean disposal sites located off the U.S. mid-Atlantic coast. Patterns of metals distribution show that: (1) Five specific metals may be used as identification tags for individual wastes disposed at the two sites, and (2) disposed materials tend to be transported by currents south and southwest from the disposal sites, and (3) biological availability and potential toxicity of metals pose a threat to marine biota. (Katz)
W78-04887

FISH TOXICITY OF JET FUELS--I. THE TOXICITY OF THE SYNTHETIC FUEL JP-9 AND ITS COMPONENTS,
California Univ., Berkeley. Sanitary Engineering Research Lab.
D. Jenkins, S. A. Klein, and R. C. Cooper.
Water Research, Vol. 11, p 1059-1067, 1977. 8 fig, 6 tab, 10 ref.

Descriptors: *Fuels, *Toxicity, *Freshwater fish, *Shiners, *Rainbow trout, Oil wastes, Laboratory tests, Bioassay, Lethal limit, Growth stages, Environmental effects, Salmonids, Trout, Mortality, *Jet fuels, Fuel JP-9, *Flagfish, *Golden shiner, RJ-4, RJ-5, MCH, Bioaccumulation.

The toxicity of the jet fuel JP-9 and its components RJ-4, RJ-5 and MCH was assessed in static bioassays on the warm water fish, golden shiner (Notemigonus chrysoleucas). As determined by the 96-h LC50 values unemulsified fuel JP-9 was 235 times less toxic, RJ-4 was 196 time less toxic, RJ-5 was 7700 times less toxic and MCH was 3.3 times less toxic than the corresponding emulsified materials. In continuous flow bioassays with the water soluble fraction of the fuel and its components the effect on egg hatchability and fry development of flagfish (Jordanella floridae) and rainbow trout (Salmo gairdneri) was studied. The accumulation of fuels in fish bodies was studied and it was found that flagfish can tolerate a total body burden of 0.5 mg MCH wet weight without lethality. It was also found that body burdens of 0.43 mg RJ-4 and 0.27 mg RJ-5 on a wet weight basis will produce 50% mortality in rainbow trout. Voiding of MCH from fish bodies occurs readily in fuel-free water, but RJ-4 and RJ-5 were retained in the tissues. (Klein)
W78-04888

TOLERANCE OF ESTUARINE BENTHIC DIATOMS TO HIGH CONCENTRATIONS OF AMMONIA, NITRITE ION, NITRATE ION AND ORTHOPHOSPHATE,
Groningen Rijsuniversiteit (Netherlands). Dept. of Systematic Botany.
W. Admiraal.
Marine Biology, Vol. 43, p 307-315, 1977. 4 fig, 4 tab, 28 ref.

Descriptors: *Diatoms, *Primary productivity, *Nitrogen compounds, *Phosphate, *Ammonia, *Nitrates, *Nitrites, *Growth rates, Estuaries, Benthos, Hydrogen ion concentration, Photosynthesis, Water quality, Laboratory tests, Marine algae, *Orthophosphates, The Netherlands.

Ten species of benthic diatoms were cultured unialgally in synthetic media with various concentrations of ammonia ($NH_4^+ + NH_3$), nitrite ion, nitrate ion, and orthophosphate. Most of the species grew well in media with very high concentrations of nitrite ion (1 to 10 mg-at N l-1), nitrate ion (about 16.9 mg-at N l-1) and orthophosphate (at least 0.9 mg-at P l-1). Ammonia concentrations higher than 0.5 mg-at N l-1 inhibited growth of the cultures. The rate of photosynthesis of diatoms from the field and from cultures was also inhibited by 0.5 mg-at N l-1 of ammonia under certain conditions. Inhibition of photosynthesis by ammonia was strongly enhanced by high irradiance and high pH. It was unlikely that nitrite ion, nitrate ion, and orthophosphate attained concentrations high enough to be inhibitory in the field, but concentrations of ammonia may have been high enough for inhibition to occur. A clear relationship between sensitivity of the diatoms and their occurrence on more or less polluted mudflats was not found. (Klein)
W78-04889

MERCURY STRESS ON JUVENILE BAY SCALLOPS, ARGOPECTEN IRRADIANS, UNDER VARIOUS SALINITY TEMPERATURE REGIMES,
National Marine Fisheries Service, Milford, CT. Milford Lab.
D. A. Nelson, A. Calabrese, and J. R. MacInnes.
Marine Biology, Vol 43, p 292-297, 1977. 2 fig, 2 tab, 13 ref.

Descriptors: *Mercury, *Salinity, *Temperature, *Toxicity, Juvenile Growth Stage, Thermal stress, Invertebrates, Shellfish, Mollusk, Water quality, Laboratory tests, *Bioassay, Argopecten irradians, *Scallops, Bay scallops.

Survival of Juvenile bay scallops after 96 h of exposure to mercury at various salinity and temperature regimes was studied. Scallop survival was significantly affected by mercury concentration and by salinity, as well as by the interaction between temperature and concentration and between temperature and salinity. Toxicity of mercury at low concentrations was enhanced by high temperature and low salinity, whereas at high mercury concentrations this effect diminished. (Klein)
W78-04891

THE EFFECTS OF FREE CHLORINE AND CHLORAMINE ON GROWTH AND RESPIRATION RATES OF LARVAL LOBSTERS (HOMARUS AMERICANUS),
Woods Hole Oceanographic Institution, MA.
J. M. Capuzzo.
Water Research, Vol 11, p 1021-1024, 1977. 3 fig, 3 tab, 12 ref.

Descriptors: *Chlorine, *Organic compounds, *Lobsters, *Metabolism, *Growth rates, *Respiration, *Larval growth stage, Invertebrates, Laboratory tests, Larvae, Growth stages, Crustaceans, Aquatic life, Bioassay, *Chloramine.

The length, dry weight and standard respiration rate of larval lobsters were monitored for 19 days following a 60 min exposure at 25C to 1.0 mg/l applied free chlorine and 1.0 mg/l applied chloramine. Compared to control organisms, significantly lower increases in dry weight and significant reductions in standard respiration rates were measured among exposed organisms; greater differences were detected among chloramine exposed organisms. From these results it was concluded that acute exposure to either free chlorine or chloramine resulted in subsequent reductions in growth and metabolic activity of larval lobsters. (Klein)
W78-04892

EFFECTS OF NATURALLY OCCURRING AQUATIC ORGANIC FRACTIONS ON CADMIUM TOXICITY TO SIMOCEPHALUS SERRULATUS (DAPHNIDAE) AND GAMBUSIA AFFINIS (POECILIIDAE),
Savannah River Ecology Lab., Aiken, SC.
J. P. Giesy, Jr., G. J. Leversee, and D. R. Williams.
Water Research, Vol 11, p 1013-1020, 1977. 5 tab, 55 ref.

Descriptors: *Cadmium, *Toxicity, Water quality, *Daphnia, *Livebearers, *Organic compounds, *Ions, Analytical techniques, Chemical analysis, Ponds, Wells, Chemistry, Invertebrates, Zooplankton, Fish, Bioassay, Binding capacity, Musguito fish, Ganbusia, LC 50, Cadmium binding capacity.

Cadmium toxicity to Simocephalus serrulatus and Gambusia affinis in soft well water, highly organic pond water well water containing various organic fractions isolated from pond water was determined and compared to Cd binding capacity of each water type. Pond organics were separated into three nominal molecular diameter fractions using ultrafiltration. Cadmium binding capacity was determined using selective ion electrodes. Pond water and organic fractions bound Cd, reducing the amount of free Cd 2+ as determined by Cd selective ion electrode. Whole pond water reduced Cd toxicity to S. serrulatus but had little effect on Cd toxicity to G. affinis. The three larger molecular diameter organic fractions reduced Cd toxicity to S. serrulatus, while the smallest fraction slightly increased Cd toxicity. Cadmium 96-h LC50 values could be predicted from Cd binding capacities determined by selective ion electrode. (Klein)
W78-04893

TOXICITY OF CHLORINE TO JUVENILE SPOT, LEIOSTOMUS XANTHURUS,
Environmental Research Lab., Gulf Breeze, FL.; and Environmental Research Lab., Narragansett, RI.
D. P. Middaugh, A. M. Crane, and J. A. Couch.
Water Research, Vol 11, p 1089-1096, 1977. 9 fig, 1 tab, 25 ref.

Descriptors: *Chlorine, *Toxicity, *Resistance, *Juvenile growth stage, Fish, *Temperature, *Thermal stress, Estuaries, Bioassay, Lethal limit, Effluents, Water quality, Laboratory tests, Chlorination, Environmental effects, Tissue analysis, *Spot, Bioaccumulation, Leiostomus xanthurus, Sensitivity, Histopathology, Avoidance tests, Histology.

The sensitivity of juvenile spot to total residual chlorine (TRC) in flowing seawater was investigated. Incipient LC50 bioassays, histopathology, avoidance tests and the combined effect of thermal stress and TRC were used to assess sensitivity. Estimated incipient LC50 values were 0.12 mg 1-1 TRC at 10C and 0.06 mg 1-1 TRC at 15C. Histological examination of spot used in the incipient LC50 bioassay at 15C and sacrificed while alive indicated pseudobranch and gill damage occurred in individuals exposed to a measured TRC concentration of 1.57 mg 1-1. Spot exposed to lower concentrations of TRC, 0.02-0.06 mg 1-1 at 15C and sacrificed alive showed no consistent tissue damage. Spot demonstrated temperature dependent avoidance responses to TRC. At 10C, a concentration of 0.18 mg 1-1 was required for significant avoidance; at 15 and 20C, spot showed significant avoidance of TRC concentrations as low as 0.05 mg 1-1. Simultaneous exposure of spot to thermal stress (5, 10 or 13C above the acclimation temperature of 15C) at measured TRC concentrations of 0.05, 0.07 and 0.34-0.52 mg 1-1 demonstrated a significant increase in sensitivity to TRC with increased temperature and exposure times for some of the groups tested. (Klein)
W78-04895

THE ACUTE TOXICITY OF SIX MONOCYCLIC AROMATIC CRUDE OIL COMPONENTS TO STRIPED BASS (MORONE SAXATILIS) AND BAY SHRIMP (CRAGO FRANCISCORUM),
National Marine Fisheries Service, Tiburon, CA. Tiburon Lab.
P. E. Benville, Jr., and S. Korn.
California Fish and Game, Vol 63, No 4, p 204-209, 1977. 2 tab, 18 ref.

Descriptors: *Organic compounds, *Toxicity, *Aromatic compounds, *Oil, *Striped bass, *Shrimp, Laboratory tests, *Bioassay, Mortality, Lethal limit, Sea basses, Marine fish, Crustaceans, Water quality, Analytical techniques, Gas chromatography, *Oil, Oil pollution, *Bay shrimp, Morone saxatilis, Crago franciscorum, *Benzene, *Toluene, *Ethylbenzene, *P-xylene, *M-xylene, *O-xylene.

The acute toxicities of benzene, toluene, ethylbenzene, p-xylene, and o-xylene were determined for striped bass and bay shrimp by static bioassay. The 96-h LC50's ranged from 2.0 to 11 micro 1/1 (ppm), for striped bass and from 0.49 to 20 micro 1/1 (ppm) for bay shrimp. Solubilities of these aromatics were determined by gas chromatography in 16C seawater with a salinity of 25 o/oo as part of the procedure for dosing the animals. The solubilities were 1400, 330, 180, 180, 210, and 230 micro 1/1 (ppm), respectively, which was high enough to be lethal to striped bass and bay shrimp. The toxic effect of the aromatics was more latent in shrimp than in fish as demonstrated by the difference in the 24- and 96-h tests. (Klein)
W78-04896

ABSORPTION OF IRON AND GROWTH OF HYDRILLA VERTICILLATA (L.F.) ROYLE,
Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.

F. M. Basiouny, L. A. Garrard, and W. T. Haller.
Aquatic Botany, Vol 3, p 349-356, 1977. 3 fig, 1 tab, 24 ref.

Descriptors: Aquatic plants, *Iron, *Growth rates, *Absorption, Nutrients, Chlorophyll, Plant tissues, Plant physiology, Metabolism, Nutrient requirements, Laboratory tests, Biomass, Plant growth, Manganese, Tissue analysis, Bioaccumulation, *Hydrilla verticillata, *FeEDTA.

Increasing levels of FeEDTA to the nutrient solution in which Hydrilla verticillata was growing resulted in changes in the overall growth and development of the plants. Tissue levels of Fe and chlorophyll increased as Fe levels in the nutrient solution were increased from 0 to 8.0 ppm. Hydrilla absorbed and accumulated Fe in much larger amounts than were required for its optimum growth. The highest tissue Fe concentration was obtained with 6.0 ppm Fe in the growing medium. However, the best growth was obtained at 8 ppm Fe. Increasing levels of Fe in the nutrient solution resulted in progressive decrease in Mn uptake by the plants. Under the conditions of this study, best growth and greatest dry weight of Hydrilla were obtained at an exceptionally high Fe/Mn ratio (85). (Klein)
W78-04897

CHARACTERIZATION AND TREATMENT OF WASTE DISCHARGED FROM HIGH-DENSITY CATFISH CULTURES,
Tennessee Valley Authority, Chattanooga. Div. of Environmental Planning.
For primary bibliographic entry see Field 5B.
W78-04898

GAS-LIQUID CHROMATOGRAPHY DETERMINATION OF RESIDUES OF METHANESULFONATE OF META-AMINOBENZOIC ACID ETHYL ESTER IN FISH,
Fish and Wildlife Service, Warm Springs, GA. Southeastern Fish Control Lab.
For primary bibliographic entry see Field 5A.
W78-04899

UPTAKE, METABOLISM AND EXCRETION OF THE MOLLUSCICIDE N-TRITYLMORPHOLINE BY THE TROPICAL FOOD FISH SAROTHERODON MOSSAMBICUS (PETERS),
Centre for Overseas Pest Research, London (England).
P. Matthiessen.
Journal of Fish Biology, Vol. 11, p 497-509, 1977. 7 fig, 1 tab, 15 ref.

Descriptors: *Toxicity, *Metabolism, *Molluscicides, Absorption, Pesticides, Fish physiology, Path of pollutants, Laboratory tests, Analytical techniques, Environmental effects, Fish, Bioaccumulation, Excretion, *N-tritylmorpholine(Frescon), *Sarotherodon mossambicus, Tissue analysis, *Tropical food fish.

Uptake, metabolism, and excretion of radiolabelled N-tritylmorpholine (Frescon) were studied in the tropical food fish Sarotherodon mossambicus. After 55 h exposure to sub-lethal solutions, concentration factors in the whole fish were as high as 1300 (up to 40 mg/kg), at least 80% of the absorbed activity being unchanged Frescon. Approximately 40% of this activity was found in bone, 16% in gut, 16% in muscle, and 10% in gill. The bile was found to be a route of Frescon excretion, and recovering fish excreted 50% of the absorbed activity in 55 h. The applicability of these results to the field situation was discussed. (Klein)
W78-04900

GROWTH OF THE CARRAGEENAN-PRODUCING TROPICAL RED SEAWEED HYPNEA MUSCIFORMIS IN SURFACE WATER, 870 M DEEP WATER, EFFLUENT FROM A CLAM MARICULTURE SYSTEM, AND IN DEEP WATER ENRICHED WITH ARTIFICIAL FERTILIZERS OR DOMESTIC SEWAGE,
Lamont-Doherty Geological Observatory, Palisades, NY.
K. C. Haines.
In: 10th European Symposium on Marine Biology, Ostend, Belgium, Vol. 1, p 207-220, 1975. 8 fig, 4 tab, 8 ref.

Descriptors: *Rhodophyta, *Growth rates, *Primary productivity, *Plant growth, *Nutrition requirements, Ammonia, Aquatic plants, Effluents, Algae, Water types, Metabolism, Nitrates, Phosphates, Nutrients, Iron, Metals, Vitamins, Carbon, Nitrogen, Aquiculture, *Marine algae, *Hypnea musciformis, Tissue analysis, Carrageenan.

Growth of Hypnea musciformis in the effluent of an upwelling mariculture system on St. Croix, Virgin Islands, in which 870 m deep water was used to grow planktonic algae which were then fed to bivalve shellfish, was about five times faster than growth in unaltered deep water and about 3 times faster than in surface seawater. Growth was positively correlated with ammonia concentration in the water supplied to the seaweed, but there was no correlation with nitrate or phosphate concentration. The growth stimulation by the effluent from the shellfish mariculture system was achieved by enriching deep water with ammonia plus a chelated iron-trace metals-vitamins mix, but was not achieved by enriching the deep water with ammonia alone or with chelated mixture alone. Increasing the ammonia supply while keeping the chelated mixture constant produced an increasing growth rate. Enrichment of deep water with 4% primary-treated sewage and 35% secondary-treated sewage also increased growth of H. musciformis relative to its growth in deep water alone. Carbon, nitrogen, and carrageenan contents of the seaweed grown under various nutritional conditions were presented. (Klein)
W78-04902

ON THE DISTRIBUTION OF PARTICULATE METALS, CHLOROPHYLL AND SESTON IN THE BALTIC SEA,
Biologische Anstalt Helgoland (West Germany).
For primary bibliographic entry see Field 5B.
W78-04904

THE PERSISTENCE OF CHRONICALLY ACCUMULATED HYDROCARBONS IN THE HARD SHELL CLAM MERCENARIA MERCENARIA,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
P. D. Boehm, and J. G. Quinn.
Marine Biology, Vol 44, 1977, p 227-233. 1 tab, 2 fig, 30 ref.

Descriptors: *Oil, *Oil pollution, Water pollution effects, On-site-investigations, *Mollusks, *Clams, Animal biochemistry, Persistence, Rhode Island, Animal physiology, Path of pollutants, Commercial fishing, *Commercial shellfish, *Aquiculture, Laboratory tests, Monitoring, *Petroleum hydrocarbons, Hard shell clams, *Narragansett Bay(RI), Providence River(RI), *Hydrocarbon depuration, *Hydrocarbon persistence.

Hard shell clams from the chronically polluted environment of the Providence River, USA, were transferred to a clean laboratory system located in lower Narrangasett Bay, Rhode Island. The hydrocarbon contents of these transplanted clams were monitored for 120 days after transfer. After this period only slight depuration had occurred. A 41.9 microg g wet weight -1 average initial hydrocarbon burden decreased to 29.3 microg g-1, a decrease that became statistically significant (P less than 0.1) only after 120 days. At most, only 30% of the clams' hydrocarbons were lost. These findings indicate that the duration of the exposure period and the chemical nature of the source hydrocarbons are both instumental in determining the persistence of these compounds in filter-feeding bivalves. Chronically accumulated petroleum hydrocarbons are strongly retained by the organisms and are only very slowly depurated. (Katz)
W78-04905

INCREASES OF CD AND THE CD:ZN RATIO IN THE HIGH MOLECULAR WEIGHT PROTEIN POOL FROM APPARENTLY NORMAL LIVER OF TUMOR-BEARING FLOUNDERS (PAROPHYRS VETULUS),
British Columbia Univ., Vancouver. Inst. of Oceanography.
D. A. Brown.
Marine Biology, Vol 44, 1977, p 203-209. 3 tab, 2 fig, 53 ref.

Descriptors: *Cadmium, *Zinc, *Metals, *Marine fish, Commercial fish, *Fish diseases, *Animal pathology, Animal physiology, Fish physiology, Toxicity, Public health, Proteins, Water pollution effects, Path of pollutants, *Copper, *Flounders, Parophrys vetulus, Cadmium:Zinc ratio, Liver, Tumors, Tumor-bearing flounders, Heavy metal levels, High molecular weight proteins, Nucleic acid metabolism.

It is evident from previous studies that heavy metal levels are changed in tumor-bearing organisms relative to nontumor-bearing organisms, particularly in apparently normal liver tissue. This study considered the possible role of metallothioneins in binding excess Cd, Cu or Zn in the liver of tumor-bearing flounders (Parophrys vetulus). Cadmium and zinc were not increased significantly on the metallothionein peak, but were increased 3.3- and 2.4-fold, respectively, on the high molecular weight protein peak. In addition, the Cd:Zn ratio was increased by 40% on the high molecular weight protein peak. Results are discussed in terms of competition of Cd and Zn for Zn-requiring enzymes involved in nucleic acid metabolism. Possible reasons for excess Cd occurring on the high molecular weight protein peak rather than on the metallothinein peak are discussed. Copper levels did not change. (Katz)
W78-04906

ZINC AND CADMIUM IN THE PACIFIC HAKE MERLUCCIUS PRODUCTUS OFF THE WESTERN U.S. COAST,
Oregon State Univ., Corvallis. School of Oceanography.
J. R. N. Cutshall, and W. G. Pearcy.
Marine Biology, Vol 44, 1977, p 195-201. 3 tab, 2 fig, 24 ref.

Descriptors: *Zinc, *Cadmium, *Metals, Water pollution effects, Path of pollutants, Heavy metals, Marine fish, *Commercial fish, Commercial fishing, Fish food organisms, Marine animals, Washington, Oregon, California, *Public health, Biochemistry, Fish physiology, *Puget Sound(Wash), Euphausiids, *Pacific hake, Merluccius productus, Muscle tissue concentration.

Concentrations of zinc and cadmium in muscle tissue or whole Pacific hake, Merluccius productus (Ayres), increase with increasing total wet weight, especially for smaller fish. These trends appear to be related to the euphausiid diet of hake. Except for the isolated population in Puget Sound, no relationship between zinc or cadmium concentration and collection site is apparent. (Katz)
W78-04907

VIABILITY OF EMBRYOS OF THE WINTER FLOUNDER PSEUDO-PLEURONECTES AMERICANUS EXPOSED TO COMBINATIONS OF CADMIUM AND SALINITY AT SELECTED TEMPERATURES,
Environmental Research Lab., Narragansett, RI.

R. A. Voyer, C. E. Wentworth, Jr., E. P. Barry, and R. J. Hennekey.
Marine Biology, Vol 44, (1977), p 117-124, 5 tab, 1 fig, 121 ref.

Descriptors: *Cadmium, *Metals, Salinity, Water temperature, *Bioassay, Methodology, *Toxicity, Fish eggs, Aquiculture, Fish physiology, Fish reproduction, Juvenile fish, Water pollution effects, Laboratory tests, Marine fish, *Winter flounder, Flatfish, Pseudopleuronectes americanus, Fifty percent hatches, Fish embryos, Embryo viability.

Developing eggs of the winter flounder were exposed to 9 combinations of cadmium and salinity at 5 and 10C. Overall mean times to 50% hatch ranged from 7.7 days at 10C to 17.9 days at 5C. Mean percentages of total hatches ranged from 50 to 100% for all treatment combinations. Response-surface analyses indicate percentages of viable hatches were generally lowest at 10o/oo S and highest in the 25 to 30o/oo S range. Regression analyses of viable hatch data show that at both temperatures cadmium significantly influenced viable hatch in all experiments. Viable hatch was alsio significantly influenced by the linear and quadratic effect of salinity in both tests at 5C and in 2 of 3 tests at 10C. The interaction between cadmium and salinity also significantly affected viable hatch at 10C. (Katz)
W78-04908

SYNERGISTIC EFFECTS OF LEAD, SALINITY, AND TEMPERATURE ON EMBRYONIC DEVELOPMENT OF THE MUSSEL MYTILUS GALLOPROVINCIALIS,
Institut Rudjer Boskovic Rovinj (Yugoslavia). Center for Marine Research.
M. Hrs-Brenko , C. Claus, and S. Bubic.
Marine Biology, Vol 44, (1977), p 109-115. 3 tab, 8 fig, 17 ref.

Descriptors: Bioassay, *Methodology, *Heavy metals, *Lead, *Salinity, *Mussels, Bivalves, Water temperature, Growth stages, Larvae, Laboratory tests, Water pollution effects, Spawning, *Statistical methods, Mollusks, *Embryonic development, *Adriatic Sea, *Synergistic effects, Mytilus galloprovincialis, *Factorial design.

Combined effects of lead, salinity and temperature on the embryonic development of the mussel Mytilus galloprovincialis Lmk. were studied under laboratory conditions. The basic experimental design used 4 lead concentrations (100, 250, 500, and 1000 ppb Pb2+) and 6 salinity levels (from 25 to 37.5o/oo with 2.5o/oo intervals). These factorial designs were carried out at three constant temperatures (15, 17.5, and 20C). The statistical analysis indicated that salinity changes have more effect on the embryonic development than temperature. Optimal development was observed at 34.8o/oo and 15.6C, which is in accordance with observations in the field. The effect of lead was minimal in optimal salinity and temperature conditions. The deleterious effect of lead on the embryonic development was especially conspicious at 20C. Under experimental conditions, lead caused a delay or inhibition of the embryonic development with the occurrence of a large number of abnormal larvae. (Katz)
W78-04909

DEVELOPMENT OF NORTH SEA COASTAL PLANKTON COMMUNITIES IN SEPARATE PLASTIC BAGS UNDER IDENTICAL CONDITIONS,
Central Lab. TNO., Helder (Netherlands). Dept. of Marine Ecology.
J. Kuiper.
Marine Biology, Vol 44, 1977, p 97-107. 11 fig, 33 ref.

Descriptors: *Methodology, On-site investigation, Laboratory tests, *Plankton, *Phytoplankton, *Zooplankton, Marine algae, Laboratory equipment, Marine biology, Water pollution effects, Populations, Plant populations, *Nutrients, Animal populations, Copepods, Chlorophyll, Nitrates, Nitrites, Phosphates, *North Sea, Marine waters, *Coastal plankton communities, Dominant zooplankton, Den Helder, Netherlands, Dominant phytoplankton.

In two experiments lasting 4 to 6 weeks, communities of North Sea coastal plankton kept in separate plastic bags (of about 1400 l) and exposed to the same environmental conditions showed very similar patterns of growth and decline. This result means that the method is suitable for the evaluation of toxic effects of environmental pollutants at low concentrations on complex plankton systems. The phytoplankton in the bags produced a succession of blooms, which were probably limited by shortage of nutrients. The dominant zooplankton organisms were various species of copepods which can develop in the bags from egg to adult. Strong indications were found that mineralization of organic matter occurs in the bags. (Katz)
W78-04910

ABSENCE OF PIGMENTATION IN CORIXID BUGS (HEMIPTERA) AFTER THE USE OF THE AQUATIC HERBICIDE DICHLOBENIL,
Ministry of Agriculture, Fisheries, and Food, London (England). Salmon and Freshwater Fisheries Lab.
T. E. Tooby, and D. J. Macey.
Freshwater Biology, Vol 7, 1977, p 519-529. 2 tab, 1 fig, 21 ref.

Descriptors: *Herbicides, Insects, Aquatic insects, Aquatic animals, Benthos, Aquiculture, *Fish food organisms, Water pollution effects, Path of pollutants, *Invertebrates, Juvenile growth stage, *Pigments, *Corixid bugs, *Sigara dorsalis, Aquatic herbicides, *Dichlobenil, Nymphs, Adult insects, Tissue residues, *Depuration, Pigmentation.

Unpigmented nymphs and adults of the corixid bugs Sigara dorsalis and Corixa punctata were found in ponds treated with the aquatic herbicide dichlobenil. Tissue residues accumulated rapidly in nymphs exposed to dichlobenil, and pigmentation was inhibited during ecdysis. However, dichlobenil residues were rapidly eliminated from the tissues of unpigmented nymphs placed into clean water, and pigmentation returned during the following ecdysis. (Katz)
W78-04911

APPRAISAL OF A REFERENCE TOXICANT FOR ESTIMATING THE QUALITY OF OYSTER LARVAE,
Washington State Dept. of Fisheries, Brinnon. Shellfish Lab.-Point Whitney.
For primary bibliographic entry see Field 5A.
W78-04912

ACCLIMATION AND REARING OF STRIPED BASS LARVAE IN SEA WATER,
California State Dept. of Fish and Game, San Diego, La Jolla.
K. Lal, R. Lasker, and A. Kuljis.
California Fish and Game, Vol 63, No 4, p. 210-218, 1977. 5 tab, 16 ref.

Descriptors: *Sport fish, *Larval growth stage, *Growth stages, *Growth rates, *Mortality, Fish hatcheries, Fish management, *Fish eggs, *Salt tolerance, Salinity, *Saline water, *Striped bass, Bioassay, Acclimation, *Salinity tolerance.

Results on salinity tolerance of striped bass eggs showed higher survival of larvae in salinities was further enhanced by acclimating 1-day-old larva instead of eggs. Larvae were rapidly acclimated to full sea water within 1 month and reared successfully under laboratory conditions for a period of 15 months. The average and maximum growth compared favorably with that found in natural waters. (Katz)
W78-04913

A SURVEY ON THE MERCURY CONTENT OF THE PERSIAN GULF SHRIMP,
Tehran Univ. (Iran). Dept. of Food Hygiene.
For primary bibliographic entry see Field 5A.
W78-04914

EFFECTS OF SUBLETHAL CONCENTRATIONS OF LIGNOSULPHONATES ON GROWTH, INTESTINAL FLORA AND SOME DIGESTIVE ENZYMES OF RAINBOW TROUT (SALMO GAIRDNERI),
National Veterinary Inst. Oslo (Norway).
S. O. Roald.
Aquaculture, Vol 12, p. 327-335, 1977. 2 fig, 3 tab, 23 ref.

Descriptors: *Rainbow trout, *Growth rates, *Enzymes, *Digestion, *Animal metabolism, Fish physiology, *Pulp wastes, *Lignins, *Toxicity, Bacteria, Industrial wastes, Pulp and paper industry, *Lignosulphonates.

Young rainbow trout were exposed to lignosulphonates at various concentrations. The higher concentrations had the most retarding effect on growth, but a clear general relationship between lignosulphonate concentrations and growth retardation was not observed. There was no significant difference in quantitative or qualitative composition of the intestinal flora of the different groups. A possible connection between the reduced growth rates and depressed activities of the digestive enzymes was also discussed. (Katz)
W78-04915

ORGANOCHLORINE RESIDUES IN FISH AND FISHERY PRODUCTS FROM THE NORTHWEST ATLANTIC,
Fisheries and Marine Service, Halifax (Nova Scotia).
For primary bibliographic entry see Field 5B.
W78-04916

MANAGEMENT OF MAN-MADE EUTROPHICATION: THE SWEDISH CONCEPT,
Association of Swedish Chemical Industries, Stockholm (Sweden).
For primary bibliographic entry see Field 5G.
W78-04917

ORGANIC COMPOUNDS IN AN INDUSTRIAL WASTEWATER: A CASE STUDY OF THEIR ENVIRONMENTAL IMPACT,
Massachusetts Inst. of Tech. Cambridge. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W78-04918

ACCUMULATION OF AROMATIC HYDROCARBONS IN TISSUES OF PETROLEUM-EXPOSED MALLARD DUCKS (ANAS PLATVRHVNCHOS),
New Orleans Univ., LA. Center for Bio-Organic Studies.
G. C. Lawler, W-A. Loong, and J. L. Laseter.
Environmental Science and Technology, Vol 12, No 1, p 51-54, 1978. 3 fig, 1 tab, 20 ref.

Descriptors: *Oil, Spills, *Oil pollution, *Organic compounds, *Aromatic compounds, *Mallard duck, *Absorption, *Water birds, Animal metabolism, Gas chromatography, Mass spectrometry, South Louisiana crude, Aromatic petroleum, Hydrocarbons, Squaleve, Biphenyl.

Mallard drakes were dosed with 5 mL a day of crude oil for 14 days. Petroleum aromatics were found in every experimental tissue analyzed. The skin and underlying adipose tissue had far more accumulated aromatic hydrocarbons than the other tissues, which included: liver, breast muscle, brain, uropygial gland, and blood. Aromatic hydrocarbons did not accumulate in the same relative concentrations as found in the crude oil. The more toxic 2 and 3 condensed ring aromatics were accumulated to a greater extent than the alkylbenzenes. (Katz)
W78-04919

ACCUMULATION OF SATURATED HYDROCARBONS IN TISSUES OF PETROLEUM-EXPOSED MALLARD DUCKS (ANAS PLATVRHVNCHOS),
New Orleans Univ., LA. Center for Bio-Organic Studies.
For primary bibliographic entry see Field 5A.
W78-04920

NITROGEN CYCLING IN A MARINE PLANKTONIC FOOD CHAIN: NITROGEN FLUXES THROUGH THE PRINCIPAL COMPONENTS AND THE EFFECTS OF ADDING COPPER,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
W. G. Harrison, and J. M. Davies.
Marine Biology, Vol. 43, p 299-306, 1977. 3 fig, 4 tab, 26 ref.

Descriptors: *Nitrogen, *Nitrogen cycle, *Copper, *Heavy metals, *Zooplankton, *Food chains, *Nitrates, *Tracers, *Ammonium compounds, *Copepods, Plankton, Seston, Radioactivity techniques, Water pollution effects.

Nitrogen cycling in a natural planktonic food chain was followed before and after perturbation by copper. It was apparent from this analysis that gross features of the cycling of nitrogen through a planktonic food chain, particularly at the herbivore level, can be significantly altered by the introduction of copper (at 10 micrograms/L-1 concentration into the systems. The overall effect depended largely upon the importance of the zooplankton components and their fluxes to the total nitrogen-cycling. (Katz)
W78-04921

EFFECTS OF DDT AND POLYCHLORINATED BIPHENYLS ON CELLULAR METABOLISM AND ULTRASTRUCTURE OF CRITHIDIA FASCICULATA, A FLAGELLATED PROTOZOAN,
Armed Forces Radiobiology Research Inst., Bethesda, MD.
J. E. French, and J. F. Roberts.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A033 507, Price codes: A02 in paper copy, A01 in microfiche. AFRRI Scientific Report SR76-31, 1976. 26 p, 10 fig, 1 tab, 32 ref.

Descriptors: *Polychlorinated biphenyls, *Aroclors, *DDT, *Pesticide toxicity, *Cytological studies, *Growth rates, *Radiochemical analysis, *Protozoa, Chlorinated hydrocarbon pesticides, Pesticides, Toxicity, Metabolism, Population, Animal physiology, *Mitochondria, *Nucleic acids, Crithidia.

DDT and polychlorinated biphenyls (PCB's) have been shown to be toxic to Crithidia fasciculata by inhibition of cell population growth. These results suggested that further studies were required for understanding the cell population growth inhibition. Energy metabolism, protein and nucleic acid biosynthesis, and ultrastructure were chosen as indices for determining the metabolic sites of the inhibition. Ultrastructural changes induced by these compounds included cellular and mitochondrial swelling, disruption of the mitochondrial genophore, and failure of the mitochondrion to replicate in synchrony with cell division. It is concluded that the initial DDT or PCB inhibition of nucleic biosynthesis and subsequent loss of cell regulatory capacity causes the decrease in cell population growth. (Katz)
W78-04922

LIMNOLOGY OF SHALLOW WATERS, SYMPOSIA BIOLOGICA HUNGARICA, VOL. 15,
Tihany, Hungary, Sept. 3-8, 1973. 303 p, Akademiai Kiado: Budapest, Hungary, 1975. $19.00. Salanki, J., Ponyi, J. E. (Ed.).

Descriptors: Bacteria, Biological communities, Hungary, *Limnology, Phytoplankton, *Primary production, Rotifers, *Shallow waters, Conferences, Yugoslavia, Zooplankton, Lakes, Water pollution, Ecosystems.

Production processes in shallow water ecosystems are examined. The 1st group of papers focuses on primary production. Production was studied in Lake Balaton (Hungary), Lake Tahoe (USA), Lake Warniak (Poland), the Masurian lakes of Poland, Lake Szelid (Hungary) and the lake at Palic (Yugoslavia). The 2nd group of articles study secondary production, including the effect of fluctuating temperatures on palnkton rotifers; zooplankton biomass; characteristics of bacteria and plankton in Lake Castoria (Greece); macrofaunal biomass in Lake Velence (Hungary); and participation of bacteria in organic production in Lake Ohrid (Yugoslavia). Effects of pollution and protection of water ecosystems are considered in many articles.--Copyright 1975, Biological Abstracts, Inc.
W78-04927

THE EFFECTS OF SECONDARILY TREATED SEWAGE EFFLUENT ON THE WILLIMANTIC/SHETUCKET RIVER,
Connecticut Univ., Storrs. Biological Sciences Group.
L. Klotz.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 539, Price codes: A05 in paper copy, A01 in microfiche. University of Connecticut Institute of Water Resources, Storrs, Report No 27, November 1977. 85 p, 14 fig, 16 tab, 80 ref. OWRT A-052-CONN(16). 14-31-0001-6007.

Descriptors: *Sewage treatment, *Activated sludge, Effluents, Pollution abatement, Rivers, Algae, Bacteria, Yeasts, Invertebrates, Fish, Aquatic plants, Chemical analysis, *Nutrients, Chlorination, Pesticides, Heavy metals, *Connecticut, Bioassay, Bioindicators, *Sewage effluents, Water pollution effects, Sewage treatment improvement, *Algal assays, *Microbial indicators, *Willimantic/Shetucket River(Conn).

The results of a four-year interdisciplinary study on the effects of a municipal secondary sewage treatment plant upon the biology and chemistry of the Willimantic/Shetucket River in eastern Connecticut are presented. Selected populations of algae, macrophytes, bacteria, fungi, invertebrates and fish were studied for 1 1/2 years before and after an improvement in sewage treatment (primary settling to activated sludge). While zones typical of high organic pollution were not present, inorganic nutrients increased significantly due to the secondary sewage discharge. Downstream of the treatment plant, significant increases in nitrate-nitrogen, total phosphates, orthophosphates, conductivity and algal growth potential were measured. The endemic, rock-attached algae of the river responded to the increased growth potential produced by the effluent with a ten-fold increase in numbers and biomass, as well as a change in composition. The seasonal averages of all bacterial and yeast groups downstream of the treatment plant were always substantially higher than upstream, except during chlorination periods when most groups were equal or reduced from their upstream numbers. The treatment plant did not contribute significantly to the presence of heavy metals and pesticides which were found in the water, plants and sediment of an extended study area. In addition to a detailed examination of the effects of the secondarily treated effluent, recommendations for alleviation of some of the problems associated with the discharge are included. (de Lara-Connecticut)
W78-04945

MULTIWAVELENGTH LIDAR FOR REMOTE SENSING OF CHLOROPHYLL-A IN PHYTOPLANKTON,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-04950

SUMMARY OF NASA LANGLEY RESEARCH CENTER REMOTE SENSING ACTIVITIES UNDER THE ENVIRONMENTAL PROTECTION AGENCY INTERAGENCY AGREEMENTS: POTENTIAL FOR REGIONAL APPLICATIONS,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-04951

SURVEY OF BACTERIA, PHYTOPLANKTON, AND TRACE CHEMISTRY OF THE LOWER COLORADO RIVER AND TRIBUTARIES IN THE GRAND CANYON NATIONAL PARK,
Arizona State Univ., Tempe. Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 5A.
W78-04999

AQUATIC INVESTIGATION ON THE COLORADO RIVER FROM SEPARATION CANYON TO THE GRAND CLIFFS, GRAND CANYON NATIONAL PARK,
Nevada Univ., Las Vegas. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5A.
W78-05000

SOLUTION, DIFFUSION AND SORPTION IN THE UPPER LAYER OF LAKE SEDIMENTS: V. THE DIFFERENTIATION OF THE PROFUNDAL SEDIMENTS OF AN OLIGOTROPHIC MOUNTAIN LAKE (FELDSEE, HOCHSCHWARZWALD) BY SEDIMENT WATER INTERACTION, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Inst.
For primary bibliographic entry see Field 5B.
W78-05015

THE USE OF MAGNESIUM CARBONATE IN CHLOROPHYLL DETERMINATIONS,
Geological Survey, Atlanta, GA. National Water Quality Lab.
For primary bibliographic entry see Field 5A.
W78-05029

NUTRIENTS AND PRODUCTIVITY AS INDICATIONS OF THERMAL EFFLUENT-UPWELLING INTERACTIONS IN LAKE MICHIGAN,
Argonne National Lab., IL.
E. M. Yaguchi.
Journal of Great Lakes Research, Vol. 3, No. 1-2, p 57-64, October 1977. 3 fig, 2 tab, 42 ref.

Descriptors: *Lake Michigan, Nuclear powerplants, *Nutrients, *Aquatic productivity, *Upwelling, Lakes, Surveys, Measurement, Chemical properties, Biological properties,

Phytoplankton, Thermal water, *Thermal pollution, Water pollution, On-site investigations, Limnology, Thermal plumes.

During the summer of 1975, a field study was undertaken to examine separate and combined effects of upwelling and a thermal discharge on nutrients, productivity quotients, and phytoplankton populations in an inshore region of southwestern Lake Michigan. Reactive silicate concentrations were more than doubled during the upwelling (compared to those during stable hydrological conditions); chlorophyll a concentrations, phytoplankton diversity, and cell numbers per milliliter were also significantly greater. Productivity quotients were lower by nearly one-half during upwelling. The Zion Nuclear Plant discharges water warmed an average of 10C to the lake via a submerged high-velocity discharge. Few significant differences in chemical and biological parameters were attributable to the resulting warm water plume. Phytoplankton specific growth rates in the plume were increased over those at control stations only during upwelling. Nutrient limitation is implicated as one of several factors in the response of phytoplankton to locally increased temperature. (Sims-ISWS)
W78-05039

THE INVASION OF SAURIDA UNDOSQUAMIS (RICHARDSON) INTO THE LEVANT BASIN: AN EXAMPLE OF BIOLOGICAL EFFECT OF INTEROCEANIC CANALS,
Fisheries Technology Unit, Haifa (Israel).
M. Ben-Yami, and T. Glaser.
U S Natl Mar Fish Serv Fish Bull. 72(2), p 359-373, 1974.

Descriptors: *Canals, *Hake, *Interoceanic canals, Levant, Saurida-undosquamis, *Red Sea lizard fish, Water pollution effects, *Abiotic conditions, Levant Basin(Red Sea-Mediterranean Sea).

The Red Sea lizardfish, S. undosquamis, invaded the Levant Basin (Red Sea, Mediterranean Sea) and established a population of considerable commercial importance. Its expansion came at the expense of other commercial fishes on which it preys and with which it competes. The rapid reproduction of the Red Sea lizardfish population in the Levant Basin was made possible by a combination of changes in the environmental conditions (abiotic and biotic), one of these being the retreat of, or the recession in, the native hake population. The dynamic coexistence between the lizardfish and the hake, its main competitor, is affected by fluctuations in the abiotic conditions to which the hake seems to be more sensitive than the lizardfish.--Copyright 1974, Biological Abstracts, Inc.
W78-05062

CADMIUM UPTAKE BY THE CRAYFISH, ORCONECTES PROPINQUUS PROPINQUUS (GIRARD),
State Univ. of New York at Buffalo. Dept. of Biochemistry.
R. Gillespie, T. Reisine, and E. J. Massaro.
Environmental Research, Vol. 13, No. 3, June 1977, p 364-368, 2 fig, 9 ref.

Descriptors: Environmental effects, *Water pollution effects, Toxicity, Resistance, *Cadmium, *Crayfish, Public health, *Absorption, Bioaccumulation.

Observations showed that crayfish accumulated a mean of 18.4 ppm Cd over a period of 190.5 hours from water containing 10 ppb Cd, demonstrating an ability to concentrate Cd from water that is considered safe for human consumption and, over a relatively short time span, to accumulate more than the 13-ppm safe limit for food. The mean concentration of Cd in crayfish after 190.5 hours in water containing 1 ppm Cd was 534.4 ppm, indicating a high resistance to Cd toxicity. It was concluded that, even in water containing USPHS acceptable levels of Cd, crayfishes could become a human health hazard. (Chilton-ORNL)
W78-05068

LEAD CONCENTRATIONS IN ALGAE AND PLANTS GROWN OVER LEAD CONTAMINATED SEDIMENTS TAKEN FROM SNOW DUMPS IN OTTAWA, CANADA,
Ottawa Univ. (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W78-05071

RELATIVE SENSITIVITY TO LEAD OF A NAKED GREEN FLAGELLATE DUNALIELLA TERTIOLECTA,
Scripps Institution of Oceanography, La Jolla, CA.
J. Stewart.
Water, Air, and Soil Pollution, Vol 8, No 2, June 1977, p 243-247, 1 fig, 15 ref. NSF No. Ga, NSF No. GA-33230.

Descriptors: Environmental effects, *Water pollution effects, Heavy metals, *Lead, Algae, Toxicity, *Bioassay, *Chlorophyta, *Marine algal assay procedure.

Previous investigation has suggested a role for cell walls in shielding cells of marine algae from potential toxic effects of heavy metals. Dunaliella is a green algae which differs from other plant cells in being devoid of a cell wall. The responses of this algae when grown in a synthetic seawater medium with Pb added were similar to those of other algae, thus disproving the theory. (Chilton-ORNL)
W78-05072

STRUCTURE OF POPULATIONS OF THE DOMINATING BENTHIC ORGANISMS OF LAKE DUSYA: 2. CHIRONOMUS ANTHRACINUS ZETT. IN 1969-1972, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius Inst. Zoologii i Parazitologii.
For primary bibliographic entry see Field 2H.
W78-05074

EFFECTS OF ENVIRONMENTAL FACTORS ON THE DISTRIBUTION AND MORPHOLOGY OF VICTORELLA PAVIDA (ECTOPROCTA) IN LAKE PONTCHARTRAIN, LOUISIANA, AND VICINITY,
New Orleans Univ., LA. Dept. of Biological Sciences.
M. A. Poirrier, and M. M. Mulino.
Chesapeake Science, Vol 18, No 4, December 1977, p 347-352, 2 fig, 1 tab, 25 ref.

Descriptors: Environmental effects, *Water pollution effects, Aquatic plants, Salinity, Sewage, Storm water, Distribution, Plant morphology, *Lake Pontchartrain(La), Louisiana, *Victorella pavida.

The study reported focused upon the effects of salinity, sewage and storm-water discharge upon species distribution, abundance and species associations of Victorella pavida. V. pavida was found at salinities of 12.2 ppt and in Lake Pontchartrain was abundant upon all substrates sampled where salinities ranged from 0.1 to 5.6 ppt. Due to the abundance and uniform distribution of the organism in low salinities and its absence in the limnetic range, it was suggested that it might be used as an indicator species to determine the maximum extent of brackish-water intrusion in estuaries. There appeared to be a relationship between branching and salinity but it was concluded that other factors such as age, growth rate, predation and competition for food and space may also influence branching. V. pavida was found to be the predominant epifaunal species in areas receiving sewage and storm-water discharge. (Chilton-ORNL)
W78-05075

INFLUENCE OF A PULP AND PAPER MILL EFFLUENT ON ASPECTS OF DISTRIBUTION, SURVIVAL AND FEEDING OF NIPIGON BAY, LAKE SUPERIOR, LARVAL FISH,
Fisheries and Marine Service, Ottawa (Ontario). Great Lakes Biolimnology Lab.; and Canada Centre for Inland Waters, Burlington (Ontario).
J. K. Leslie, and J. R. M. Kelso.
Bulletin of Environmental Contamination & Toxicology, Vol 18, No 5, November 1977, p 602-610, 2 fig, 2 tab, 10 ref.

Descriptors: Environmental effects, *Water pollution effects, Pulp and paper industry, *Pulp wastes, Effluents, Larvae, Fish, Distribution, Feeds, *Lake Superior(Nipigon Bay), Great Lakes.

Larval fish were caught in quantity (500-2100/10,000 cubic meters) in surface waters of Nipigon Bay nearshore areas. In areas away from shore, abundance was low (less than 100/10,000 cubic meters). No difference was found in length or in food selection between larvae in influenced and uninfluenced areas. It was concluded that larval fish distribution and habits were either unaffected by the mill effluent or captures in the effluent were transients. (Chilton-ORNL)
W78-05076

EFFECTS OF SALINITY AND ILLUMINATION ON PHOTOSYNTHESIS AND WATER BALANCE OF SPARTINA ALTERNIFLORA LOISEL,
Duke Univ., Durham NC. Dept. of Botany.
D. J. Longstreth, and B. R. Strain.
Oecologia, Vol 31, No 2, 1977, p 191-199, 2 fig, 3 tab, 28 ref. NSF G.B-28950 IA & BMS 7100947 A02.

Descriptors: Environmental effects, *Salinity, *Light, *Photosynthesis, Transpiration, Salt marshes, *Marsh plants, *Water balance, North Carolina, *Spartina alterniflora Loisel.

Leaf photosynthesis, transpiration, total chlorophyll, leaf xylem pressure, and specific leaf weight were measured in Spartina alterniflora Loisel grown at various salinities and at two illuminations (low and high). A 50% reduction in photosynthesis was observed at salinity of 30 ppt and low illumination which was correlated with an increase in gaseous resistance. Results indicated salinity effects on photosynthesis can be ameliorated by development at high illumination. Both high salinity and high illumination were correlated with increases in specific leaf weight which appeared to be the result of increase in leaf thickness. It was concluded that salinity up to ocean water concentrations is not a principle factor limiting the development and distribution of S. alterniflora in areas of high irradiance. (Chilton-ORNL)
W78-05077

AN ECOLOGICAL SURVEY OF THE HEAVY METAL CONTAMINATION OF THE EDIBLE CLAM PAPHIA SP. ON THE IRON-ORE TAILINGS OF TOLO HARBOUR, HONG KONG,
Chinese Univ. of Hong Kong. Dept. of Biology.
M. H. Wong, and M. W. Li.
Hydrologia, Vol 56, No 3, 1977, p 265-272, 5 fig, 6 tab, 16 ref.

Descriptors: Environmental effects, *Water pollution effects, Heavy elements, Metals, *Iron, Mining, *Mine wastes, Public health, *Clams, *Hong Kong, Heavy metals, *Pollutant identification, *Manganese, *Calcium, Tailings, Iron-ore.

Clams sediments and water were collected from sites of the iron-ore tailings of Ma On Shan Iron

Mine and from a control site. Analysis showed that clams collected from the tailings had accumulated higher levels of Mn, Fe, and Ca than had clams from control sites. These clams are collected from the seashores within Tolo Harbour for consumption by villagers. This investigation points out the potential hazard of heavy metal contamination within the harbour. (Chilton-ORNL)
W78-05078

SOME FACTORS INFLUENCING THE DENSITY OF SUBARCTIC POPULATIONS OF BOSMINA LONGIROSTRIS, HOLOPEDIUM GIBBERUM, CODONELLA CRATERA AND CERATIUM HIRUNDINELLA,
Environmental Protection Agency, Yellowknife (Northwest Territories).
J. W. Moore.
Hydrobiologia, Vol 56, No 3, 1977, p 199-207, 3 fig, 2 tab, 24 ref.

Descriptors: Environmental effects, Populations, Plankton, *Temperature, Food, Light, Predation, *Bosmina longirostris, *Holopedium gibberum, *Codonella cratera, *Ceratium hirumdinella.

Results of investigation showed that temperature was the major factor influencing the density of all four species studied. While food availability possibly restricted B. longirostris, other species were not affected by this parameter. Algae were consumed in only small numbers and did not contribute significantly to density changes in the plankton. Light and predation had little influence on all species. (Chilton-ORNL)
W78-05079

ON THE FAUNA AND FLORA IN LAKE KAWAGUCHI IN SUMMER, (IN JAPANESE),
Y. Furuta, M. Suginome, and M. Tanaka.
Bull Freshwater Fish Res Lab (Tokyo). 24(1), p 1-10, 1974.

Descriptors: Aquatic plants, Aquatic animals, *Lake Kawaguchi(Japan), Eutrophication, Mesotrophy, Asplanchna-priodonta, Atteya-zachariarius, Benthos, Bosmina-amemiyai, Bosmina-longirostris, Bosminopsis-deitersi, Fish, Japan, Kellicottia-longispina, Lakes, Melosira-ambigua, Melosira-granulata, Microcystis-aeruginosa, Ploesoma-hudsoni, Ploesoma-truncatum, *Summer, Zooplankton.

A survey was carried out in Aug., 1970. Zooplankton was sampled by vertical hauling of a plankton net. Phytoplankton was sampled together with surface water using a mass cup. Zoobenthos was collected by an Ekmann-Birge bottom sampler. The distribution of fishes in the lake was studied. In the phytoplankton, Atteya zachariarius, Melosira granulata, M. ambigua and Microcystis aeruginosa were dominant; Bosminopsis deitersi, Ploesoma hudsoni, P. truncatum, Asplachna priodonta, Bosmina longirostris and B. amemiyai were dominant in the zooplankton. Lake Kawaguchi (Japan) is a mesotrophic or eutrophic lake. The plankton, zoobenthos and fishes were more abundant in the eastern area than in the western area of the lake. The horizontal distribution of B. longirostris was much denser in the eastern area than in the western area. The reverse was true for B. amemiyai. Kellicottia longispina was seen only in the western area. Lake Kawaguchi may be divided into 2 basins, the eutrophic east-basin and the mesotrophic west-basin.--Copyright 1975, Biological Abstracts, Inc.
W78-05080

COMPARATIVE STUDY OF TOXICITY, UPTAKE AND DISTRIBUTION OF CADMIUM AND MERCURY IN THE SEA WATER ADAPTED EEL ANGUILLA ANGUILLA,
Liege Univ. (Belgium). Lab. d'Oceanologie.
F. Noel-Lambot, and J. M. Bouquegneau.
Bulletin of Environmental Contamination and Toxicology, Vol. 18, No. 4, October 1977, p 418-424, 1 fig, 1 tab, 26 ref.

Descriptors: Environmental effects, *Water pollution effects, Metals, *Cadmium, *Mercury, Absorption, Distribution, *Eels, *Toxicity, Bioaccumulation, Tissue distribution.

Freshwater eels were adapted to seawater for eight days before being exposed to various concentrations of Cd and Hg (as CdC12 and HgC12) added to the water. Temperature was maintained at approximately 18C and fish were not fed during the experiments. Mercury was more toxic than cadmium with 1 ppm of Hg and 50 ppm cadmium being lethal concentrations for the eel. Cadmium was found to principally contained in the viscera and Hg in the muscles. It was suggested that the dissimilar accumulation and distribution of Cd and Hg within the eel body might be explained by the possibility of different membrane permeabilities to both metals and also by the problem of their binding within the cells. (Chilton-ORNL)
W78-05082

LEAD UPTAKE FROM SEA WATER AND FOOD, AND LEAD LOSS IN THE COMMON MUSSEL MYTILUS EDULIS,
Institut fuer Meeresforschung, Bremerhaven (West Germany).
M. Schulz-Baldes.
Mar Biol (Berl). 25(3), p 177-193, 1974.

Descriptors: Dunaliella-marina, *Lead, *Mussels, Water pollution effects, Sea water, *Bioindicators, *Absorption, Pollutant identification.

Common mussles, M. edulis (shell length 19-21 mm, average dry weight 30 mg) were maintained for 6 wk in sea water containing different concentrations of Pb (0.005-5 mg.l to the -1 power). The Pb concentration in the mussels' whole soft parts was analyzed at different times during the experiment. A constant rate of Pb uptake, linearly dependent on the Pb concentration of the medium, was observed. The temporal change of the concentration factor is also linear (regression coefficient 149.9 daily). Rate of Pb loss, measured after transferring the mussels into natural sea water, is linearly dependent on the original Pb concentration in the soft parts. Rates of uptake and loss in large mussels (shell length 45-55 mm, average dry weight 750 mg) are less than those in small mussels (shell length 19-21 mm, average dry weight 30 mg). Lead uptake by individual organs (kidney, gills, adductor muscle, digestive gland, foot, mantle with gonads) of large M. edulis (shell length 45-55 mm, average dry weight 750 mg) was analyzed in 2 test series. In the test series 'medium,' the mussels were kept in a seawater medium containing 0.01 mg Pb. 1 to the -1 power. In the test series 'food,' the mussels were kept in natural sea water but fed with the green algae Dunaliella marina containing Pb (approximately 600 micro-g. g-1 dry weight). The Pb quantity given per mussel per day was about 2 micro-g in both test series. Within 35 days, the mussels of test series 'medium' took up 29% of the total amount of Pb given, those of test series 'food' took up 23.5%. In all organs, Pb concentration increased, but rates of uptake differed; the kidney displayed by far the highest rate of uptake. With these physiological properties M. edulis is an ideal indicator organism for Pb pollution in the marine environment. A biologic calibration curve, the relationship between Pb concentration in the mussels' whole soft parts at equilibrium and Pb concentration in sea water, is presented.--Copyright 1974, Biological Abstracts, Inc.
W78-05083

POLYCHLORINATED BIPHENYLS IN COTTIDS, MUSSELS, AND SEDIMENT IN SOUTHERN PUGET SOUND, WASHINGTON,
Evergreen State Coll., Olympia, WA.
J. Mowrer, J. Calambokidis, N. Musgrove, B. Drager, and M. W. Beug.
Bulletin of Environmental Contamination and Toxicology, Vol. 18, No. 5, 1977, p 588-594, 2 fig, 1 tab, 13 ref.

Descriptors: Environmental effects, *Water pollution effects, Absorption, *Polychlorinated biphenyls, Fish, *Mussels, Sediments, Washington, *Puget Sound(Wash), *Cottids.

In Southern Puget Sound, polychlorinated biphenyl levels were found to be highest at or near areas of highest population density, industry, and shipping activity. Levels of PCB found in cottids, mussels, and sediment in this investigation were comparable to those found in similar organisms from other coastal and estuarine systems throughout the world. (Chilton-ORNL)
W78-05084

THE INFLUENCED OF SIZE, SEX AND TEMPERATURE ON THE TOXICITY OF MERCURY TO TWO SPECIES OF CRAYFISHES,
Tulane Univ., New Orleans, LA. Dept. of Biology.
M. Heit, and M. Fingerman.
Bulletin of Environmental Contamination and Toxicology, Vol. 18, No. 5, 1977, p 572-580, 6 fig, 3 ref.

Descriptors: Environmental effects, *Water pollution effects, *Mercury, *Crayfish, *Toxicity, Temperature, Size, Metabolism, Sex.

Two species of crayfishes, Procambarus clarki and Faxonella clypeata, were collected from roadside ditches for this investigation. Female crayfish of both species were better able to withstand the effects of exposure to mercury than males. A trend of increasing ability to withstand exposure to mercury was observed with increasing body size. The most important factor in withstanding exposure to mercury was found to be external temperature with the toxic effects being greater at higher temperatures. It was suggested that these temperature effects might be due to changes in metabolic rate. (Chilton-ORNL)
W78-05085

EFFECT OF TEMPERATURE ON THE GROWTH RATE OF GRIFFITHSIA TENUIS C. AGARDH (RHODOPHYTA: CERAMIALES),
Pennsylvania State Univ., Wilkes-Barre.
W. W. Reynolds, and M. E. Casterlin.
Hydrobiologia, Vol. 56, No. 3, 1977, p 225-227, 1 fig, 13 ref.

Descriptors: Environmental effects, *Thermal pollution, Thermal stress, Temperature, Algae, *Growth rates, Water pollution effects, *Griffithsia tenuis.

Griffithsia tenuis was cultured for 18 days at temperatures of 13, 18, 22 and 25C. The growth rate increased from 13 to 18C and more rapidly increased from 18 to 22C and then declined from 22 to 25C. Optimum temperature for growth under the conditions of this investigation was 22C. (Chilton-ORNL)
W78-05087

THERMAL STABILITY AND PHYTOPLANKTON IN VOLTA LAKE, GHANA,
Nigeria Univ., Nsukka (Nigeria).
S. Biswas.
Hydrobiologia, Vol. 56, No. 3, 1977, p 195-198, 2 fig, 3 tab, 8 ref.

Descriptors: *Environmental effects, Thermal pollution, Thermal stress, Phytoplankton, Lakes, Ghana, *Lake Volta(Ghana), Stability, Nutrients, Consolidated mean, Cyclic average, Transparency.

Data on thermal stability and phytoplankton were collected from various stations representing the main stretch of Volta Lake during 1966-1968. It was shown that under a predominantly low thermal stability, its increase led to increase of phytoplankton. Increase of transparency with the increase of stability was an important factor. Under a predominantly high thermal stability, its decrease led to the increase of phytoplankton. Increase of nutrients in the upper layers of the lake was an important factor. It was concluded that in view of these two conflicting correlations, the data treated as a whole produced no significant results. (Chilton-ORNL)
W78-05088

HUDSON RIVER ECOSYSTEM STUDIES - EFFECTS OF ENTRAINMENT BY THE INDIAN POINT POWER PLANT ON BIOTA IN THE HUDSON RIVER ESTUARY.
New York Univ. Medical Center, NY.
Aggenda to: The 1973 Report submitted to Consolidated Edison Company of New York, Inc. 56 p, 4 fig, 21 tab, 12 ref.

Descriptors: Environmental effects, *Powerplants, Life history studies, *Striped bass, *Intakes, New York, Reviews, Data collections, Indian Point, *Hudson River(NY).

This report presents the final results of studies conducted at Indian Point during 1973 using the full complement of available striped bass ichthyoplankton data, which have been analyzed using samples matched by date, time and depth. The report is presented in two parts. The first part is entitled A Preliminary Analysis of the Abundance of Four Life History Stages of Striped Bass (Morone saxatilis) Collected in the Intakes of Indian Point Unit 1 and in the Hudson River in Front of Indian Point. The second part is entitled Larval Striped Bass (Morone saxatilis) Length Frequency Analysis. (Chilton-ORNL)
W78-05089

ENERGY FLOW IN BEAR BROOK, NEW HAMPSHIRE: AN INTEGRATIVE APPROACH TO STREAM ECOSYSTEM METABOLISM,
Amherst Coll., MA. Dept. of Biology.
S. G. Fisher, and G. E. Likens.
Ecol Monogr. 43(4), p 421-439, 1973.

Descriptors: Algae, Detritus, *Ecosystems, *Energy budget, Heterotrophy, Leaves, *Metabolism, Moss, *New Hampshire, Photosynthesis, Primary production, Respiration, Streams, Vascular hydrophytes, Northeast US, Bear Brook watershed(NH), *Organic matter.

An annual energy budget is presented for Bear Brook, a small undisturbed 2nd-order stream in northeastern USA. The ecosystem approach, in which all input and output fluxes of potential energy as organic matter are considered, is used to describe the dynamics of energy flow in a 1700 m segment of the stream. The annual input of energy to the system is 6039 Kcal/m2. Over 99% of this is allochthonous, from the surrounding forested watershed or from upstream areas. Autochthonous primary production by mosses accounts for less than 1% of the total energy available to the ecosystem. Algae and vascular hydrophytes are absent from the stream. Meteorologic inputs (litter and throughfall) from the adjacent forest account for 44% of annual energy input. Most of this is in particulate form. The remaining 56% of input enters by geologic vectors (inflowing surface and subsurface waters). Eighty three percent of the geologic input and 47% of the total input of energy occur as dissolved organic matter. Approximately 4730 Kcal/m2 of organic detritus, nearly equally divided between leaves and branches, is stored within the system. The size of this detritus reservoir is stable from year to year. The turnover time of the branch compartment is about 4.2 yr; of the leaf compartment, about 1 yr. Although much of the annual input of energy is in a dissolved state, dissolved organic matter does not tend to accumulate in the system and displays a very rapid rate of turnover. Of the annual energy input 66% is exported to downstream areas in stream water. The remaining 34% is lost as heat through consumer activity. Bear Brook is a strongly heterotrophic steady-state system in which import and export of organic matter play a significant role. A conceptual scheme is presented by which import, export, photosynthesis, and respiration may be used to describe the functional dynamics and developmental processes of ecosystems.—Copyright 1974, Biological Abstracts, Inc.
W78-05092

ECOLOGY OF A NEW ENGLAND SALT MARSH,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
S. W. Nixon, and C. A. Oviatt.
Ecol Monogr. 43(4), p 463-498, 1973.

Descriptors: *Salt marshes, *New England, Northeast US, Estuaries, Metabolism, Marsh grasses, *Dissolved oxygen, Detritus, Birds, *Ecology, Fish, Marshes, Model studies, Sewage effluents, Shrimp, Spartina-alterniflora, Spartina-patens, Temperature.

Measurements of the abundance of major populations, their metabolism, and the seasonal patterns of total system metabolism throughout a year were used to develop energy-flow diagrams for a New England salt-marsh embayment. The annual ecological energy budget for the embayment indicates that consumption exceeds production, so that the system must depend on inputs of organic detritus from marsh grasses. Gross production ranged from almost zero in winter to about 5 g O2 m-2 day-1 in summer. Respiration values were similar, but slightly higher, with the maximum difference observed in fall. Populations of shrimp and fish were largest in fall, with a much smaller peak in spring. Few animals were present in the embayment from May to July, but fall populations of shrimp ranged from 250-800 m-2 and fish averaged over 10 m-2. Birds were most abundant in winter and spring. In spite of high numbers, no evidence was found that the marsh embayment exported large amounts of shrimp or fish to the estuary. Production of above ground emergent grasses on the marsh equaled 840 g m-2 for tall Spartina alterniflora, 432 g m-2 for short S. alterniflora, and 430 g m-2 for S. patens. These values are similar to those for New York marshes, but substantially lower than the southern marsh types. The efficiency of production of marsh grasses in the New England marsh was lower than reported for southern areas. A stimulation model based on the laboratory and field metabolism and biomass measurements of parts of the embayment system was developed to predict diurnal patterns of dissolved O2 in the marsh. The model was verified with field measurements of diurnal O2 curves. The model indicated the importance of the timing of high tides in determining O2 levels and was used to explore simulated additions of sewage biological oxygen demand (BOD) and increases in temperature.—Copyright 1974, Biological Abstracts, Inc.
W78-05093

THE IMPACT OF DEVELOPMENT PROJECTS ON ESTUARINE AND OTHER WETLAND ECOSYSTEMS,
Transport and Environment Studies. London (England).
For primary bibliographic entry see Field 6G.
W78-05095

AN OUTDOOR MODEL SIMULATING A BALTIC SEA LITTORAL ECOSYSTEM,
Swedish Water and Air Pollution Research Lab. Stockholm.
M. Notini, B. Nagell, A. Hagstrom, and O. Grahn.
Gikos, Vol. 28, No. 1, p 2-8, 1977. 5 fig, 4 tab, 18 ref.

Descriptors: *Simulation analysis, Water pollution effects, Wetlands, Aquatic algae, Aquatic life, Dissolved oxygen, Temperature, Hydrogen ion concentration, Bacteria, *Aerobic bacteria, *Littoral ecosystem, *Baltic Sea, Flow-through systems, Aerobic heterotrophic bacteria.

Main components of the flora and fauna of the Baltic littoral zone were introduced into plastic pools equipped with a flow-through system providing 2.5 l/min. During eight weeks the macroscopic epifauna and infauna of the bladder wrack, Fucus vesiculosus L., were found to be qualitatively and quantitatively fairly stable; the number of aerobic heterotrophic bacteria showed little variation. Oxygen concentration, temperature, and pH of the pools showed good agreement with those of the natural littoral ecosystem. This, together with the observed stability and the possibilities for controlling and measuring the conditions in the system, makes the model a valuable tool for assessing toxic effects on the littoral ecosystem. (Stihler-Mass)
W78-05096

MEASUREMENT OF WATER MOVEMENT IN REFERENCE TO BENTHIC ALGAL GROWTH,
Hawaii Univ., Honolulu. Dept. of Botany.
For primary bibliographic entry see Field 7B.
W78-05106

WATER QUALITY EVALUATION OF A LOWER POOL ELEVATION FOR PROPOSED ARCADIA LAKE, OKLAHOMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5B.
W78-05107

BARATARIA BASIN EUTROPHICATION CASE HISTORY,
Louisiana State Univ., Baton Rouge. Center for Wetlands Resources.
N. J. Craig, and J. W. Day, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 278, Price codes: A03 in paper copy, A01 in microfiche. Report to Louisiana State Planning Office, Baton Rouge, June 1976. 24 p, 5 fig, 3 tab, 46 ref. Ford Foundation 740-0595.

Descriptors: *Barataria Basin(LA), *Eutrophication, *Salinity, *Commercial fishing, *Nursery grounds, *Estuarine environments, *Louisiana, Estuaries, Fisheries, Wetlands, Nutrients, Forecasting, Bays, Crustaceans, Fish, Agricultural runoff, Urban runoff, Sewage, Algae.

Data collected on eutrophication and salinity changes in Barataria Basin in southern Louisiana indicate serious potential effects on the commercial fishery in the basin. Barataria Basin, an interdistributory bay-wetland system bounded by Bayou Lafourche on the west, the Mississippi River on the north and east, and the Gulf of Mexico on the south, is an important estuarine environment for many marine species, including croaker, spot, sand seatrout, sea catfish, menhaden, shrimp, striped mullet, bay whiff, and blue crab. Barataria Basin alone is responsible for some 45% of Louisiana's total commercial fishery harvest ($39.6 million in 1974), including menhaden, trout, croaker, crab, shrimp, oyster, catfish, and crawfish. Both eutrophication in the upper basin and salinity in the lower basin are increasing. Sewage, urban runoff, agricultural drainage, and salinity is due to changes in the flow of the Mississippi, land loss and inlet widening, and projects such as the Mississippi River gulf Outlet, and the Barataria Waterway. Eutrophication under present trends could result in a drastic decline and possible destruction of the nursery zone by the year 2000.

Increasing salinity is pushing the oyster zones and the salinehbrackish and brackish-freshwater marsh boundaries further inland. Data on salinity increases, as well as recommendations, and nutrient loadings are given. (Lynch-Wisconsin)
W78-05108

BIOLOGICAL SURVEY OF WILSON RESERVOIR - SALINE RIVER, KANSAS, AUGUST 1970,
Environmental Protection Agency, Cincinnati, OH. Div. of Field Investigations.
A. M. Lucas.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 874, Price codes: A02 in paper copy, A01 in microfiche. Report 1971. 13 p, 3 tab, 5 ref.

Descriptors: *Wilson Reservoir(KS), *Saline River(KS), *Water quality, *Environmental effects, *Kansas, Reservoirs, Biota, Impoundments, Surveys, Primary productivity, Benthic fauna, Phytoplankton, Algae, Light penetration, Water pollution control.

A 1970 study of the biota of Wilson Reservoir and adjacent reaches of the Saline River, Kansas, concludes that the bottom faunal community in the reservoir has improved since 1968, and that water quality in the Saline River downstream continues to be improved by the reservoir. The variety and density of benthic animals in the reservoir increased, with more uniform distribution. Burrowing mayflies, a desirable fish food, were more widely established. The increase in density of benthic fauna from 17/sq ft to 35/sq ft since 1968 was partly caused by a larger food supply in the form of greater algal productivity, which, in the downstream section, rose from 512 to 1480 mg C/sq m/day since 1968. The aquatic environment downstream from the impoundment was improved by better water quality and stabilized river flow, and a greater variety of animals associated with clean water were found. Faunal diversity increased from eight taxa in 1968 to 15 in 1970. The reservoir dilutes the saltier water from streams flowing into the Saline River, and reduces concentrations of dissolved chloride, sulfate, calcium, magnesium and sodium. Total solids and specific conductance of discharged waters were 2700 micromhos/cm and 1660 mg/l, compared with 14,700 micromhos/cm and 5710 mg/l for inflowing water. Benthic fauna in the reservoir were dominated by midge larvae. Sludgeworms were not excessively abundant, although they were dominant in downstream reaches of the reservoir. (Lynch-Wisconsin)
W78-05109

AQUATIC FIELD SURVEYS AT IOWA, RADFORD AND JOLIET ARMY AMMUNITION PLANTS, VOLUME I - IOWA ARMY AMMUNITION PLANT,
Environmental Control Technology Corp., Ann Arbor, MI.
For primary bibliographic entry see Field 5A.
W78-05111

AQUATIC FIELD SURVEYS AT IOWA, RADFORD AND JOLIET ARMY AMMUNITION PLANTS, VOLUME II - RADFORD ARMY AMMUNITION PLANT,
Environmental Control Technology Corp., Ann Arbor, MI.
For primary bibliographic entry see Field 5A.
W78-05112

AN INVESTIGATION OF THE NEARSHORE REGION OF LAKE ONTARIO IFYGL.
State Univ. of New York Coll. at Buffalo.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 268, Price codes: A13 in paper copy, A01 in microfiche. Report No. EPA-600/3-76-115, Environmental Research Laboratory, Environmental Protection Agency, Duluth, Minnesota, December 1976. 269 p, 67 fig, 56 tab, 107 ref, 2 append. 1BA608, 800701.

Descriptors: *International Field Year on the Great Lakes, *Lake Ontario, *Baseline studies, *Cladophora, *Data collections, *Nearshore zones, Shores, New York, Niagara River, Genesee River(NY), Great Lakes, Trophic levels, Oligotrophy, Eutrophication, Sediments, Algae, Zooplankton, Phytoplankton, Nutrients.

Biological, chemical, and physical baseline water quality data were gathered between April 1972 and May 1973 at 81 sampling stations in the nearshore region of southern Lake Ontario and at the mouths of the Niagara and Genesee Rivers. The study area extended from the Welland Canal to Rochester, New York, and from the shoreline eight km into the lake. The project, conducted by the Great Lakes Laboratory, was part of the International Field Year on the Great Lakes (IFYGL). Chemical and biological data generally indicated dimictic oligotrophic to mesotrophic conditions; limited historical limnological information suggested eutrophication effects at the two river mouths. Water quality generally improved with increasing distance from shore. A thermal bar kept nutrient-enriched water on the shoreward side of the bar. Growth of Cladophora appeared to be limited by suitable substrate for attachment and by wave action, rather than by chemical factors. Twelve previously-unreported zooplankton species and one phytoplankton species were collected in the lake. Sediments with higher clay content tended to contain higher concentrations of nutrients, volatile solids, and heavy metals. The zone's major nutrient sources was the Niagara River, with the influence of the Genesee River limited to the limnological spring. Extensive data is presented in appendices. (Lynch-Wisconsin)
W78-05113

EFFECTS OF THERMAL EFFLUENT AND MACROPHYTE HARVESTING ON THE BENTHOS OF AN ALBERTA LAKE,
D. N. Gallup, M. Hickman, and J. Rasmussen.
Verh. Internat. Verein. Limnol., Vol 19, p 552-561, October 1975. 2 fig, 6 tab, 9 ref.

Descriptors: *Lake Wabamun(Alberta Canada), *Thermal pollution, *Water pollution effects, *Benthic fauna, *Aquatic weed control, Alberta(Canada), Canada, Lakes, Effluents, Herbicides, Mollusks, Oligochaetes, Chemcontrol, Mechanical control, Power plants, Standing crops.

Effects of thermal pollution and of a related aquatic weed control program on the benthic fauna of Lake Wabamun, Alberta, Canada, were investigated. Heated effluents from two power stations have changed species composition, distribution, and growth rates of submerged macrophytes in the eastern part of the lake. A management program of mechanical harvesting and herbicides (paraquat-diquat) was initiated to control extensive beds of Elodea canadensis, Myriophyllum exalbescens, Potamogeton pectinatus, P. richardsonii, Certophyllum demersum, and Chara sp. Major factors responsible for changes observed in the benthic fauna include: (1) water temperature; (2) the current produced by the outflow canal (which probably caused the changes in plant species); and (3) sediment type. Causative factors connected with thermal pollution seem to favor a mulluscan community associated with the vegetation, and an oligochaete community in the sediments. In Kapasiwin Bay, near one of the power stations, predominance of aquatic insects (Chironomidae) and crustaceans (Hyalella azteca) distinguishes this area from the open lake, where standing crops of these and total animals are much lower. Cutting and harvesting the aquatic plants produced a significant decrease in Physa gyrina, which occupies the upper portions of macrophyte stems; populations of Chironomidae and Amphipoda were reduced to a lesser degree. (Lynch-Wisconsin)
W78-05115

THE EFFECT OF CADMIUM, COPPER, MERCURY, ZINC AND LEAD ON CELL DIVISION, GROWTH, AND CHLOROPHYLL-A CONTENT OF THE CHLOROPHYTE CHLORELLA VULGARIS,
Herbert H. Lehman Coll., Bronx, NY. Dept. of Biological Sciences.
J. J. Rosko, and J. W. Rachlin.
Bulletin of the Torrey Botanical Club, Vol. 104, No. 3, p 226-233, July-September 1977. 3 fig, 3 tab, 39 ref.

Descriptors: *Chlorella vulgaris, *Algae, *Heavy metals, *Toxicity, *Water pollution effects, Chlorophyll, Plant growth, Cell division, Cell size, Chlorophyta, Cadmium, Copper, Mercury, Zinc, Lead, Pollutants, Toxins, Photosynthesis, Cations.

Increasing concentrations of copper, mercury, and cadmium increased chlorophyll-a content per cell of the chlorophyte Chlorella vulgaris, while lead and zinc concentrations decreased chlorophyll-a content, in a study conducted to quantify tolerance limits of the alga of the five heavy metals. A commonly-observed phenomenon of low concentrations of very toxic metals enhancing cell division was likewise observed in this study; when cells were exposed to 0.0056 mg/l copper, 0.56 mg/l zinc, and 1.0 mg/l lead, cell numbers after 33 days (minus initial inoculum) were 19,780, 20,240, and 19,270 respectively, compared with 18,190 in the control. Cell division with low concentrations of mercury and cadmium were identical to controls. Higher concentrations of copper (0.32 mg/l), cadmium (0.32 mg/l), mercury (2.4 mg/l), and zinc (7.5 mg/l) resulted in cell counts of 6,830, 3,290, 7,110, and 7,970; a lead concentration of 32.0 mg/l resulted in 18,050 cells after 33 days. Cells exposed to higher concentrations of cadmium and to copper were significantly larger than control cells after 33 days, while cells grown in 2.4 mg/l mercury were significantly smaller than controls after 16 days. (Lynch-Wisconsin)
W78-05116

LIMITING NUTRIENTS AND MAXIMUM GROWTH RATES FOR DIATOMS IN NARRAGANSETT BAY,
Trondheim Univ. (Norway). Biological Station.
E. Sakshaug.
Journal of Experimental Marine Biology and Ecology, Vol. 28, No. 2, p 109-123, 1977. 5 fig, 5 tab, 24 ref. NSF 31319X.

Descriptors: *Narragansett Bay(RI), *Diatoms, *Limiting factors, *Nutrient requirements, *Algae, *Rhode Island, Growth rates, Plant growth, Nutrients, Nitrogen, Skeletonema costatum, Asterionella japonica, Dialysis, Carbon, Phytoplankton, Water temperature, Light intensity.

Nitrogen deficiency was clearly shown in dialysis cultures of the diatoms Skeletonema costatum and Asterionella japonica grown in tanks with running seawater at 50% of surface light intensity and a temperature range of 2-17C. Dialysis, which permits field analysis of phytoplankton chemical composition (measured by chlorophyll-a, ATP, nitrogen, and carbon) to determine the growth-limiting nutrient, also enables determination of maximum growth rate for the species under given environmental conditions. The experiments were carried out during March-June 1973 at the University of Rhode Island's Narragansett Bay Campus pier in 130-m dialysis bags in a 125-liter Plexiglas tank. Seawater from six m depth was pumped through the tank at a flow rate of 30 l/min, and light intensity was reduced to 50% by covering with a grey nylon net. The exponential growth rate was exponentially related to temperature at vary-

ing surface light intensities of 350-500 ly/day, with a maximum of 2.0 div./day for Skeletonema and 1.9 div./day for Asterionella at 17C. Surface light intensities below 200 ly/day resulted in a decrease in the growth rate. The chlorophyll-a/ATP ratio showed a four-fold temperature-dependent increase from March to June for both starved and exponentially-growing cells of both species. This was due to increased chlorophyll content in Skeletonema, but in Asterionella it was due to a decrease in ATP accompanied by a decrease in carbon per cell. (Lynch-Wisconsin)
W78-05117

DETERMINATION OF PRIMARY PRODUCTIVITY AND COMMUNITY METABOLISM IN STREAMS AND LAKES USING DIEL OXYGEN MEASUREMENTS,
Geological Survey, Bay Saint Louis, MS. Water Resources, Div.; and National Aeronautics and Space Administration, Bay Saint Louis, MS. National Space Technology Labs.
D. W. Stephens, and M. E. Jennings.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 645, Price codes: A05 in paper copy, A01 in microfiche. Report No. USGS/WRD/SRI-76/055, August 1976. 88 p, 1 fig, 2 tab, 35 ref, 5 append.

Descriptors: *Primary productivity, *Metabolism, *Computer programs, *Diel oxygen measurements, *Respiration, *Biological communities, *Photosynthetic oxygen, Methodology, Community metabolism, Streams, Lakes, Measurement, Dissolved oxygen, Water temperature, Salinity, Photosynthesis, Model studies, Oxygen sag.

Methods for computerized calculation of daytime net production, night respiration, and total community metabolism are described, using a diel series of dissolved oxygen, temperature, and salinity measurements. The computer program uses an Odum approach to solve the oxygen balance equation (X=P-R+or-D+0) at a single station in a stream or as a difference between upstream and downstream stations. Net oxygen production and community metabolism are calculated assuming a one-dimensional model and using a finite-difference equation. The results are useful for quantifying biological activities of aquatic communities as they influence the oxygen cycle in streams, estuaries, lakes, and reservoirs; results can also be used as input to water quality models for dissolved oxygen analysis. Program details (flow chart, deck schematic and deck setup) are given in an appendix, along with examples of program output in various uses. Limiting assumptions of this approach to solution of the oxygen balance equation include: (1) reaeration is constant; (2) advective transport is absent, or oxygen transport is known; (3) water accrual or loss is known; (4) turbulence is low enough to permit observation of a nighttime decline in dissolved oxygen; and (5) plant biomass is sufficient to provide daytime increase in photosynthetic oxygen; in standing waters, the lower limit for measurable oxygen production occurs when phytoplankton densities fal below 1 mg chlorophyll a per cu m. (Lynch-Wisconsin)
W78-05119

CHEMICAL DEGRADATION OF MILITARY STANDARD FORMULATIONS OF ORGANOPHOSPHATE AND CARBAMATE PESTICIDES I. CHEMICAL HYDROLYSIS OF DIAZINON,
Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD.
For primary bibliographic entry see Field 5B.
W78-05120

PERSISTENCE OF AZINPHOSMETHYL IN SOIL,
Environmental Protection Agency, Wenatchee, WA. Field Studies Section.
For primary bibliographic entry see Field 5B.
W78-05121

MOSQUITO PRODUCTION AND CONTROL IN ANIMAL WASTE LAGOONS,
North Carolina State Univ. at Raleigh. Dept. of Entomology.
R. C. Axtell, D. A. Rutz, M. R. Overcash, and F. J. Humenik.
In: Managing Livestock Wastes, ASAE Publication PROC-275, Proceedings of the 3rd International Symposium on Livestock Wastes held at the University of Illinois, Urbana-Champaign, April 21-24, 1975. p 15-18, 21, 4 fig, 3 tab, 10 ref.

Descriptors: *Mosquitoes, *Sewage lagoons, *Farm wastes, *Insecticides, *Waste disposal, *Manure, Culex pipiens quinquefasciatus, Brachydeutera argentata, Lagoons, Sewage disposal, Insects, Hogs, Poultry, Farm management, Pesticides, North Carolina, Agriculture, Livestock, Solid wastes, Simulation analysis.

Simulated farm animal waste lagoons were used to determine the relationship between hog and poultry manure loading rates and mosquito production, and the effectiveness of two insect growth regulators and five insecticides. Samples from five lagoons in Johnston County, North Carolina were analyzed June-October 1974. The optimal pollution level for production of the southern house mosquito (Culex pipiens quinquefasciatus) in 625 cu ft tanks was at a loading rate of 480 cu ft of lagoon volume per 100 lb hog (supernatant COD=600 mg/l, TOC=200 mg/l), and in 7.4 cu ft drums at a loading rate of 320 cu ft of lagoon volume per 100 lb hog (supernatant COD=593 mg/l, TOC=228 mg/l). At a loading rate of 80 cu ft or less of lagoon volume per 100 lb hog there was very little mosquito production. In poultry manure in the 7.4 cu ft drums, optimal mosquito production was a a loading rate of 5.1 cu ft of lagoon volume per 4 lb bird (supernatant COD=669 mg/l, TOC=243 mg/l). Mosquito abundance was also influenced by vegetation and floating debris in the lagoons. With the growth regulators Altosid and Dimilin, and insecticides, malathion, chlorpyrifos, Abate, and Flit MLO, mosquito control was obtained from a few days to over a month; chlorpyrifos was the longest-acting. (Lynch-Wisconsin)
W78-05123

LIMNOLOGICAL AND FISHERIES SURVEY OF THE UPPER SKUNK RIVER, IOWA,
Iowa State Univ., Ames. Dept. of Zoology and Entomology.
For primary bibliographic entry see Field 5B.
W78-05124

PERIDININ-CHLOROPHYLL A PROTEINS OF DINOFLAGELLATE ALGAE,
Brookhaven National Lab., Upton, NY. Dept. of Biology.
H. W. Siegelman, J. H. Kycia, and F. T. Haxo.
Available from the National Technical Information Service, Springfield, VA 22161 as BNL-21729, Price codes: A02 in paper copy, A01 in microfiche. Energy Research and Development Administration, Report BNL-21729. 17 p, 5 fig, 2 tab, 15 ref. (1976). OT E(30-1)-16.

Descriptors: *Peridinin-chlorophyll a proteins, *Proteins, *Dinoflagellates, *Pigments, *Photosynthesis, Amphidinium carterae, Glenodinium, Chlorophyll, Algae, Phytoplankton, Marine algae, Oceans, Carotenoids, Peridinin.

Studies of the properties of peridinin-chlorophyll-a proteins in several dinoflagellates confirm that these proteins are important light-harvesting pigments for photosynthesis in oceans and some lakes, and indicate that their distinctive patterns may provide biochemical markers for particular species. The proteins contribute significantly to cellular absorption and may account for about 50% of total peridinin content. Their absorption coincides with the portion of the visible spectrum having maximum penetration in the water column. The dinoflagellate Amphidinium carterae cultured in artificial seawater was the primary alga studied, but other dinoflagellates--Gonyaulux polyedra, G. tamarensis, Cachonina niei, Glenodinium sp., Peridinium cincrum, and Dissodinium lunula--were also examined. Carotenoid pigments, including peridinin, may be more important that chlorophylls for photosynthetic energy capture by phytoplankton in the oceans. Most phytoplankton groups have a specific carotenoid accounting for a major portion of total carotenoid centent; in Dinophyceae (dinoflagellates) the predominant carotenoid is peridinin. The amino acid composition of purified peridinin-chlorophyll-a proteins from A. carterae and Glenodinium sp. is given, as well as the molecular weight of the proteins for A. carterae, G. polyedra, G. tamarensis, C. niei, and Glenodinium sp. (Lynch-Wisconsin)
W78-05125

PRELIMINARY REPORT TO INTERNATIONAL DECADE OF OCEAN EXPLORATION (IDOE) ON THE POSSIBLE EFFECTS OF THE CERATIUM TRIPOS BLOOM IN THE NEW YORK BIGHT, MARCH-JULY 1976,
Brookhaven National Lab., Upton, NY. Dept. of Applied Science.
P. G. Falkowski, and S. O. Howe.
Available from the National Technical Information Service, Springfield, VA 22161 as BNL-21944, Price codes: A02 in paper copy, A01 in microfiche. Energy Research and Development Administration, Report BNL-21944. 7 p, 2 fig, 4 ref. (1976). EY-76-C-02-0016.

Descriptors: *New York Bight, *Ceratium tripos, *Eutrophication, *Model studies, *Simulation analysis, New York, New Jersey, Algae, Dinoflagellates, Chlorophyll, Carbon, Stratification, Bays, Anaerobic conditions, Biochemical oxygen demand, Hypolimnion, Oxygen depletion.

A computer simulation model explores combined effects of benthic respiration and respiration of the dinoflagellate Ceratium tripos on the oxygen depletion rate below the thermocline in the New York bight. C. tripos was largely responsible for a subsurface algal bloom March-July 1976 in the New York Bight extending from eastern Long Island to southern New Jersey. The subsurface chlorophyll-a maximum occurred at a depth of about 30 m, below the 0.3% light depth and coincident with the base of the thermocline. While cells in the overlying mixed layer probably were autotrophic, the majority of the population below the compensation depth and thermocline were probably capable of phagotrophy. The simulation indicated that within two months the oxygen concentration in the botton 5-m layer reached a steady concentration which was 45% of the initial concentration of 0.6 mg at 02 per liter. The simulated oxygen depletion rate below the thermocline is extremely sensitive to changes in eddy diffusivity, with small decreases producing simulated anoxia. The integrated Ceratium respiration rate exceeded the benthic oxygen consumption rate of 1.0 mg as 02/sq m/hr by a factor of 19.5. Ceratium biomass also is a potentially significant source of biological oxygen demand. Assuming specified carbon and oxygen molar ratios, oxidation of Ceratium (3255 mg at C/sq m) within 20 m of the bottom would require 8463 mg at 02/sq m or 71% of the initial total oxygen in the same volume. (Lynch-Wisconsin)
W78-05126

APONIN, A CYTOLYTIC FACTOR TOWARD THE RED TIDE ORGANISM, GYMNODINIUM BREVE. BIOLOGICAL ASSAY AND PRELIMINARY CHARACTERIZATION,
University of South Florida, Tampa. Dept. of Chemistry.
D. F. Martin, and B. B. Martin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 286, Price codes: A02 in paper copy, A01 in microfiche.

Journal Environmental Science Health, Vol. A11, No. 10 and 11, p 613-622, 1976. 2 fig, 9 ref. SG-04-6-158-4405 and 04-5-158-44.

Descriptors: *Aponin, *Red tide, *Fishkill, *Algal control, Cytolysis, Bioassay, Biocontrol, Cyanophyta, *Gymnodinium breve, Gomphosphaeria aponina, *Dinoflagellates, Phytoplankton, Florida, Toxicity, Sea water, Eutrophication.

An improved method is described for isolating aponin, a cytolytic agent against the dinoflagellate Gymnodinium breve, a cause of fish mortalities associated with Florida red tides. Aponin is extracted from Gomphosphaeria aponina, a cyanophyte known to inhibit growth of G breve. The improved isolation procedure consists of subjecting G. aponina cultures to continuous cell centrifuging, acidification with concentrated hydrochloric acid to pH 6, extraction with CHC13, and concentration in a rotary evaporator under reduced pressure at 35C. Preliminary purification was attained using silica gel chromatography, followed by permeation gel chromatography. Temperature, pH, and temporal stability studies were conducted with aponin and G. breve in artificial seawater. Cytolytic activity provided a practical means of evaluating physical and chemical effects on aponin. Thermal inactivation of cytolytic activity did not occur following incubation for one hour at temperatures ranging from 30-110C, indicating that aponin is much more thermally stable than G. breve, which lost most ichthyotoxic properties within one hour at temperature above 75-80C. Aponin was stable with incubation of 48 hours at 30C at pH 1-5, but at pH 6 activity began to decrease. Kinetic studies showed an increase in cytolytic activyt during the first day of incubation, a constant level for 10-11 days, and a decrease after 14 days. (Lynch-Wisconsin)
W78-05128

REMOTE SENSING ANALYSIS OF LAKE LIVINGSTON AQUATIC PLANTS, 1975 FINAL REPORT,
Texas A and M Univ., College Station. Remote Sensing Center.
For primary bibliographic entry see Field 5A.
W78-05134

NEOPLASTIC SKIN LESIONS IN SALAMANDERS FROM A SEWAGE LAGOON CONTAINING PERYLENE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
J. G. Windsor, Jr., R. E. LaFlamme, R. A. Hites, and F. L. Rose.
Science, Vol. 198, p 1280-1281, 1977. 8 ref.

Descriptors: *Insecticides, *Pesticides, *Pesticide residues, *Pesticide toxicity, *Toxicity, *Sewage lagoons, *Waste storage, *Insect control, *Salamanders, Mosquitoes, *Water pollution sources, Water pollution effects, *Perylene, *Neoplasms.

The etiology of neoplastic skin lesions in a population of salamanders was debated by two research groups. The method by which the presumed pathogenic chemical, perylene, entered the lagoon was probably as a mosquitocide. (Katz)
W78-05136

EFFECTS OF CHROMATE AND CADMIUM ON MOST PROBABLE NUMBER ESTIMATES OF NITRIFYING BACTERIA IN ACTIVATED SLUDGE,
California State Univ., Los Angeles. Dept. of Microbiology and Public Health.
L. L. Fargo, and R. W. Fleming.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 3, p 350-354, 1977. 4 tab, 5 ref.

Descriptors: *Heavy metals, *Cadmium, *Nitrification, *Activated sludge, *Growth rates, *Animal growth, *Biological membranes, Water pollution effects, Bacteria, Industrial wastes, *Chromate, *Nitrosomonas, *Nitrobacter.

This study was an effort to determine the effects of chromate and cadmium on the number of nitrifying bacteria obtained from activated sludge samples. The results indicated that chromate severely inhibits growth of Nitrosomonas and that cadmium in concentrations below 100.0 had little effect on either Nitrosomonas or nitrobacter. The lack of an effect on Nitrobacter may be due to differences in intracytoplasmic membranes in the cell envelope. (Katz)
W78-05137

BIOACCUMULATION IN FISH OF CHLORINATED PHENOLS FROM KRAFT PULP MILL BLEACHERY EFFLUENTS,
Swedish Water and Air Pollution Research Lab. Stockholm.
L. Landner, K. Lindstrom, M. Karlsson, J. Nordin, and S. Sorensen.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 6, p 663-673, 1977. 2 fig, 2 tab, 8 ref.

Descriptors: *Rainbow trout, Pulp and paper industry, *Pulp wastes, *Lignins, *Bleaching wastes, *Phenols, *Chlorine, *Chlorination, *Toxicity, *Fish physiology, *Animal metabolism, Gas chromatography, Path of pollutants, *Bioaccumulation, Tissue analysis, Chlorinated phenols.

The present work examined low-molecular weight chlorinated compounds, identified to be present in the effluents from Swedish Kraft pulp bleacheries, to determine if the toxic compounds showed tendencies to accumulate in fish. Controlled exposure to several types of effluent demonstrated a significant uptake of at least three different chlorinated phenols into rainbow trout body parts (i.e. liver and muscle). (Katz)
W78-05138

THE TOXICITY OF KELTHANE TO THE GRASS SHRIMP (CRANGON FRANCISCORUM),
California Univ., Davis. Dept. of Land, Air and Water Resources.
S. Khorram, and A. W. Knight.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 6, p 674-682, 1977. 3 fig, 4 tab, 19 ref.

Descriptors: *Toxicity, *Mortality, *Bioassay, Animal metabolism, *Commercial shellfish, Animal behavior, *Miticides, *Chlorinated hydrocarbon pesticides, *Insecticides, *Shrimp, Water pollution effects, *Bioaccumulation, *Kelthane, Sub-lethal effects.

The acute toxicity of Kelthane, an organochlorine insecticide, on grass shrimp was determine by using static bioassay tests. The 24-and 48-hour LC50's were 777 to 2138 and 437 to 832 ppb, respectively. Kelthane was also found to have sublethal effects on feeding, molting and motor control. (Katz)
W78-05139

EFFECTS AND FATE OF A SURFACTANT IN CULTURES OF THE RED TIME ORGANISMS, GVMNODINIUM BREVE,
University of South Florida, Tampa. Dept. of Chemistry.
W. S. Hitchcock, and D. F. Martin.
Bulletin of Environmental Contamination and Toxicology, Vol. 18, No. 3, p 291-296, 1977. 2 fig, 1 tab, 11 ref.

Descriptors: *Plankton, *Red tide, *Dinoflagellates, *Gvmnodinium, *Biodegradation, *Surfactants, *Toxicity, *Mortality, *Alkylbenzene sulfonates, Water pollution sources, Phosphates, Degradation, Biological membranes, Fishkill, Methodology, Water pollution control.

Results of the present study indicate the useful mode of introducing a proper surfactant in the water column to manage a red tide bloom, and they indicated the rate of movement of surfactant in non-turbulent water. Further, the results indicate the basis of studying naturally occurring surfactant that could be environmentally acceptable and that could manage a red tide. Finally, the results with sub-lethal concentrations indicate the possibility of inactivating G. breve cell, presumably without releasing toxin into the water column. Reactivation of the cells is due to degradation of surfactant, or conversion of surfactant micelles, or, possibly, adaptation of the cells. (Katz)
W78-05140

CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT: EFFECT OF MERCURY ON ENCLOSED WATER COLUMNS. I. MANIPULATION OF EXPERIMENTAL ENCLOSURES,
Tsukuba Univ., Ibaraki (Japan). Inst. of Biological Sciences.
For primary bibliographic entry see Field 5A.
W78-05141

CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT: EFFECT OF MERCURY ON ENCLOSED WATER COLUMNS. II. MARINE BACTERIOPLANKTON,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5A.
W78-05142

CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT: EFFECT OF MERCURY ON ENCLOSED WATER COLUMNS. III. PHYTOPLANKTON POPULATION CYNAMICS AND PRODUCTION,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5A.
W78-05143

CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT: EFFECT OF MERCURY ON ENCLOSED WATER COLUMNS. IV. ZOOPLANKTON POPULATION DYNAMICS AND PRODUCTION,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5A.
W78-05144

CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT: EFFECT OF MERCURY ON ENCLOSED WATER COLUMNS. V. GROWTH OF JUVENILE CHUM SALMON (ONCORHYNCHUS KETA),
British Columbia Univ. Vancouver. Inst. of Oceanography.
For primary bibliographic entry see Field 5A.
W78-05145

EVALUATION OF A CELL CULTURE ASSAY FOR DETERMINATION OF WATER QUALITY OF OIL-REFINERY EFFLUENTS,
Oklahoma State Univ., Stillwater. Dept. of Biochemistry; Oklahoma State Univ., Stillwater. Dept. of Statistics; and Oklahoma State Univ., Stillwater. Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W78-05146

CHLORINATED HYDROCARBON RESIDUES IN THE DIET AND EGGS OF THE FLORIDA BROWN PELICAN,
Florida Univ., Gainesville. Pesticide Research Lab.
N. P. Thompson, P. W. Rankin, P. E. Cowan, L. E. Williams, Jr., and S. A. Nesbitt.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 3, p 331-339, 1977. 1 fig, 5 tab, 19 ref.

Descriptors: *Dieldrin, *DDT, *DDE, *DDD, *Chlorinated hydrocarbon pesticides, *Pesticide residues, *Polychlorinated biphenyls, Water pollution effects, Gas chromatography, Calcium, Metabolism, Monitoring, Water pollution effects, *Diets, *Brown pelican, Endangered population, Pelican eggs.

The potential instability of a population of Brown Pelicans was investigated by monitoring chlorinated hydrocarbon residues in their diet and eggs. Decreases in DDT and metabolite concentration were noted compared to previous investigations. The authors postulate that, with the usage of DDT severely restricted, this chemical will not endanger the viability of the species. (Katz)
W78-05147

ACUTE TOXICITY OF INORGANIC CHLORAMINES TO EARLY LIFE STAGES OF BROOK TROUT (SALVELINUS FONTINALIS),
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
G. L. Larson, F. E. Hutchins, and D. A. Schlesinger.
Journal of Fish Biology, Vol 11, p 595-598, 1977. 1 fig, 1 tab, 8 ref.

Descriptors: *Toxicity, *Salmonids, *Trout, *Brook trout, Fish physiology, Mortality, Lethal limit, Chlorine, Inorganic compounds, Growth stages, Resistance, Bioassay, Fry, Juvenile growth stage, Analytical techniques, *Chloramines, Salvelinus fontinalis, Alevins.

The acute toxicity of inorganic chloramines to brook trout alevin, fry, and juvenile life stages was determined in 96-h tests. Toxicity was not constant between the life stages. Alevins were more tolerant than the fry group tested. Alevins showed a decreased tolerance with an increase of body weight. Two groups of juveniles were similar in tolerance to the heaviest alevin group. A relationship between life stage-body weight of brook trout and 96-h median tolerance limits was presented. (Klein)
W78-05149

ENZYME ACTIVITIES IN THE SERUM OF RAINBOW TROUT, SALMO GAIRDNERI RICHARDSON; AND THE EFFECTS OF WATER TEMPERATURE,
Stuttgart Univ. (West Germany). Inst. fuer Siedlungswasserbau und Wasserguetewirtschaft.
D. M. Sauer, and G. Haider.
Journal of Fish Biology, Vol 11, p 605-612, 1977. 8 fig, 1 tab, 18 ref.

Descriptors: *Salmonids, *Trout, *Rainbow trout, *Water temperature, *Enzymes, *Biochemistry, *Chemical reactions, Proteins, Analytical techniques, Catalysts, Laboratory tests, Heated water, Fish physiology, Tissue analysis, Lactate dehydrogenase, Hydroxy butyric dehydrogenase, Glutamic oxalacetic transaminase, Glutamic pyruvic transaminase, Glutamate dehydrogenase, Creatinine kinase, Alkaline phosphatase, Leucine amino peptidase.

Activities of lactate dehydrogenase, hydroxy butyric dehydrogenase, glutamic oxalacetic transaminase, glutamic pyruvic transaminase, glutamate dehydrogenase, creatinine kinase, alkaline phosphatase, and leucine amino peptidase were determined in the area of rainbow trout. The animals had previously been adapted to temperatures of 3.5, 6, 8, 10, 12.5, 15, 17, 19, 21.5, and 23C. Most of the enzyme activity increased with the rise in temperature. The activity of alkaline phosphatase decreased in the range 6-19C, while the changes in the glutamate dehydrogenase activity took a complex course. (Klein)
W78-05150

RESIDUAL TOXICITY OF SEVERAL DISINFECTANTS IN DOMESTIC WASTEWATER,
Grand Valley State Coll., Allendale, MI.
R. W. Ward, and G. M. DeGraeve.
Journal Water Pollution Control Federation, Vol 50, No 1, p 46-60, 1978. 13 tab, 18 ref.

Descriptors: Freshwater fish, *Toxicity, *Growth rates, *Disinfection, *Mortality, *Waste water(Pollution), Bromine, Chlorine, Chlorides, Effluents, Ozone, Fish reproduction, Sulfur compounds, Resistance, Chlorination, Bioassay, *Fathead minnows, Pimephales promelas, Sulfur dioxide, Bromine chloride.

A life cycle study with fathead minnows (Pimephales promelas) was designed to simultaneously test in parallel the toxicity of a non-disinfected effluent stream and the residual toxicity of identical effluent streams disinfected with chlorine, bromine chloride, or ozone, as well as a chlorinated stream dechlorinated with sulfur dioxide. The following conclusions were supported by the study: Mean total residual C1 concentrations as low as 0.045 mg/l in secondary effluent negatively affected the survival of fathead minnows; levels to 0.033 mg/l retarded their growth. The adverse effects of residual C1 on the survival and growth of P. promelas were eliminated by dechlorination with sulfur dioxide with no undesirable side effects. Mean residual bromine chloride levels as low as 0.034 mg/l were found to inhibit minnow growth. Long-term exposure to oxonated effluent with mean residual ozone levels of 0.016 mg/l or less did not affect the survival, growth or reproduction of fathead minnows. (Klein)
W78-05151

THE COMPARISON OF ACTIVATED AND DIGESTED SLUDGE EXTRACTS IN CULTIVATING CHLORELLA PYRENOIDOSA AND C. SALINA,
Chinese Univ. of Hong Kong. Dept. of Biology.
M. H. Wong.
Environmental Pollution, Vol. 14, p 207-211, 1977. 2 fig, 1 tab, 11 ref.

Descriptors: *Chlorella, *Productivity, *Growth rates, *Sludge, Organic wastes, Activated sludge, Aquatic life, Algae, Effluents, Sewage lagoons, Laboratory tests, Chemical analysis, Metals, Elements, Calcium, Copper, Nitrogen compounds, Phosphorus compounds, Potassium, Cadmium, Magnesium, Iron, Zinc, *Chlorella pyrenoidosa, Chlorella salina, Digested sludge.

Extracts of activated and digested sludge were used for cultivating Chlorella pyrenoidosa and C. salina in the laboratory. It was discovered that the growth rate of the freshwater and marine Chlorella species cultivated in the extracts were higher than in the conventional media, Kuhl medium, and the MAV enrichment medium. The contents of the two types of extracts were similar. The digested sludge extract possessed higher contents of total nitrogen, water-soluble phosphorus, Ca, and Cu, and lower contents of NH3-N, K, Cd, Mg, Fe, and Zn. (Klein)
W78-05153

SOIL-PLANT-WATER ASPECTS OF OZONE PHYTOTOXICITY IN TOMATO PLANTS,
Guelph Univ. (Ontario). Dept. of Horticultural Science.
H. Khatamian, N. O. Adedipe, and D. P. Ormrod.
Plant Soil. 38(3), p 531-541, 1973.

Descriptors: Growth rates, *Tomatoes, Lycopersicon-Esculentum, *Ozone phytotoxicity, Soils, Stomata, *Toxicity, Water pollution effects, Plant growth, Soil-water-plant relationships.

Tomato (Lycopersicon esculentum Mill.) plants were grown in controlled environments and subjected to different soil water regimes. At 3-, 5-, and 7-leaf growth stages, plants were fumigated with ozone at 50 or 100 pphm for 1 h. Plants at 5- or 7-leaf stage were not sensitive to ozone as were the young plants fumigated at 3-leaf stage. At the 7-leaf stage, leaf injury at near-optimum water condition was very minimal, even at ozone concentration of 100 pphm. Ozone treatment decreased total dry matter of optimally watered plants fumigated at the 3-leaf stage. Plants subjected to water stress resulting in low leaf relative turbidity prior to ozone fumigation, were considerable protected from ozone phytotoxicity. Open stomata were an important factor in ozone phytotoxicity. Post-fumigation water regimes had no effect on eventual leaf injury.--Copyright 1974, Biological Abstracts, Inc.
W78-05154

COMBINED IN VITRO ACTIVITY OF TRIMETHOPRIM AND SULPHONAMIDES ON FISH - PATHOGENIC BACTERIA,
Ministry of Agriculture, Fisheries and Food, Burnham-on-Crouch (England). Fisheries Lab.
D. H. McCarthy, J. P. Stevenson, and A. W. Salsbury.
Aquaculture, 3(1), p 87-91, 1974.

Descriptors: Aeromonas-punctata, Aeromonas-salmonicida, *Bacteria, Fish diseases, Haemophilus-piscium, *Pathogenic bacteria, Phenazole, Pseudomonas-sp, Pyridazine, Sulfadiazine, Sulfadimidine, Sulfamerazine, Sulfamethoxy, Sulfamethyl, Sulfanilamide, Sulfathizole, *Sulfonamides, *Trimethoprim, Vibrio-anguillarium, Water pollution effects.

The relative in vitro activity of 7 sulfonamides, sulfadiazine, sulfanilamide, sulfadimide, sulfamerazine, Sulfathiazole, Sulfamethoxypyridazine and sulfamethylphenazole, each linked in turn to trimethoprim, was assessed for representatives of the following fish-pathogenic bacteria: Aeromonas punctata, A. salmonicida, Vibrio anguillarum, Pseudomonas sp., Haemophilus piscium.--Copyright 1975, Biological Abstracts, Inc.
W78-05155

YIELD OF CHANNEL CATFISH AND COMPOSITION OF EFFLUENTS FROM SHALLOW-WATER RACEWAYS,
Fish Farming Experimental Station, Stuttgart, AR.
D. L. Tackett.
Prog Fish-Cult. 36(1), p 46-48, 1974.

Descriptors: *Channel catfish, *Chemical wastes, Effluents, Equations, Raceways(Shallow water), Water pollution effects.

A yield of 120 kg/m3 (7.5 lb/ft3) of marketable channel catfish was produced in an experimental raceway system having 0.34 m3 (12 ft3) of water volume, a water depth of 23 cm (9 in.) and an inflow of 23 l/min (6 gal/min). Stocking size and density determined the average weight of the fish at harvest. The prediction equation was: $Y = 1.053x1 - 2.724x2 + 520.284$ where Y equals average weight in grams, x1 is stocking size in grams and x2 is number of fish stocked/raceway. The concentration of chemical constituents in the influent and effluent differed significantly only in suspended solids and biological O2 demand.--Copyright 1975, Biological Abstracts, Inc.
W78-05156

INTERACTIONS OF DIETARY ALPHA-TOCOPHEROL, OXIDIZED MENHADEN OIL

AND ETHOXYQUIN ON CHANNEL CATFISH (ICTALURUS PUNCTATUS),
Georgia Agricultural Experiment Station, Savannah.
T. Murai, and J. W. Andrews.
J Nutr. 104(1), p 1416-1431, 1974.

Descriptors: *Channel catfish, *Fish diets, *Ethoxyquin, *Menhaden oil, *Tocopherol, Fish mortality, Fish pathology, Water pollution effects.

A 3 x 3 x 2 factorial feeding study with channel catfish (I. punctatus) included the following dietary treatments: 0, 25 and 100 mg/kg dl-alpha-tocopherol; 0, 10 and 100 g/kg oxidized menhaden oil; and 0 and 125 mg/kg ethoxyquin. Fish fed diets containing oxidized menhaden oil without supplemental alpha-tocopherol or ethoxyquin exhibited poor growth, food conversion and survival rates; high incidenc of 3 distinct gross syndromes-exudative diathesis, muscular dystrophy and depigmentation; fatty livers; anemia; and pronounced histological changes in muscle fibers, kidney and pancreatic tissue. Although these conditions were improved by the addition of either alpha-tocopherol or ethoxyquin, analysis of variance of data revealed differentiation in effects. Tocopherol had a very strong main effect on all variables; ethoxyquin did not have a significant effect ($P > 0.05$) on hematocrit levels and incidences of muscular dystrophy. Growth reduction, hematological changes and the occurrence of muscular dystrophy and fatty livers were not observed in fish fed diets without diathesis, depigmentation, and mortality were present in this dietary treatment. Data from this study suggest that 25 mg/kg alpha-tochopherol and 125 mg/kg ethoxyquin, or 100 mg/kg alpha-tocopherol should provide adequate protection in most practical catfish diets.--Copyright 1975, Biological Abstracts, Inc.
W78-05157

THE ISLAND MASS EFFECT ON THE PHYTOPLANKTON AND PRIMARY PRODUCTION OF THE HAWAIIAN ISLANDS,
Australian Inst. of Marine Sciences, Townsville.
M. Gilmartin, and N. Revelante.
Exp Mar Biol Ecol. 16(2), p 181-204, 1974.

Descriptors: Distribution, Water pollution effects, Diatoms, Hawaiian Islands, *Island mass, Mixing, Nutrients, *Phytoplankton, *Standing crops, *Primary productivty, *Chlorophyll.

A 170 station oceanographic reconnaissance in the nearshore waters of the Hawaiian Islands emphasizes the 'island mass' effect in increasing primary production and chlorophyll a standing crop as well as in altering community assimilation ratios. The distribution of oceanographic parameters and micronutrients indicate that one of the enriching mechanisms is turbulence and vertical mixing in island channels. The species composition of the net phytoplankton communities characteristic of inshore, offshore and oceanic station is given and the relative importance of the nannoplankton component discussed. The nannoplankton dominated in all regions, with a tendency for the net/nannoplankton ratio to increase toward the base of the euphotic zone. The net phytoplankton consisted chiefly of open ocean diatom species with neritic species restricted to a narrow inshore environment.--Copyright 1975, Biological Abstracts, Inc.
W78-05158

PRELIMINARY BIOCHEMICAL OBSERVATIONS OF FISHES INHABITING AN ACIDIFIED LAKE IN ONTARIO, CANADA,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5A.
W78-05159

DEMONSTRATION OF THE ACTIVITY OF MUREINE HYDROLASE DURING THE BREAKDOWN OF A BLOOM OF ANABAENA SOLITARIA KLEB, (IN GERMAN),
Tuebingen Univ. (West Germany). Inst. fuer Chemische Pflanzenphysiologie.
H. E. A. Schenk, and F. Juettner.
Arch Hydrobiol. 74(1), p 1-7, 1974.

Descriptors: *Cyanophyta, *Eutrophication, Lakes, Anabaena-planctonica, Anabaena-solitaria, Lysozyme, *Murein hydrolases, *West Germany(Wahnbachtalsperre).

Several factors effecting lysis of blooms of Cyanophyta are discussed. A new test for mureine hydrolases is described. Activity of mureine hydrolases was demonstrated in sterile filtrates of lake water (Wahnbachtalsperre, near Bonn, W. Germany) with blooming A. planctonica. The activity of mureine hydrolases found does not appear to come from lysozyme.--Copyright 1975, Biological Abstracts, Inc.
W78-05160

STUDIES ON MANGROVE COMMUNITIES IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Dept. of Marine Sciences.
P. R. Burkholder, and L. R. Almodovar.
Fla Sci. 36(1), p 66-74, 1973.

Descriptors: Primary productivity, Marine algae, Acanthophora-spicifera, Anadyomene-stellata, Batophora-oerstedii, Carbon-14 method, Caulerpa-racemosa, Caulerpa-verticillata, Chlorophyll, Dictyota-dichotoma, Halimeda-incrassata, Lagoons, *Mangrove, *Puerto Rico, Rhizophora-mangle, Tropical regions, Valonia-ventricosa, Wrangelia-bicuspidata.

Quantitative data were presented for the occurrence and primary productivity of marine algae growing on the roots of red mangrove (Rhizophora mangle) in southern Puerto Rico. The wet weight of algae per root (of 9 roots) averaged 274 g. The average number of algal species per root (of 10 roots) was 5.1 and the greatest number per root was ten. A list of species which were dominant on individual roots includes: Acanthophora spicifera, Anadyomene stellata, Batophora oerstedii, Caulerpa racemosa, C. verticillata, Dictyota, dichotoma, Halimeda incrassata, Valonia ventricosa, Wrangelia bicuspidata and occasionally others. In a set of typical physiological observations on 14 kinds of algae chlorophyll a content averaged 2.11 mg g-1. C fixed in mg per g dry wt per day averaged 34.1 with the O2 method and 14.7 with the 14C technique. The flora of an average root was calculated to produce in gross photosynthesis 1.47 g C per day, and in 'net' assimilation with the 14C method about 0.64 g C per day. The flora of a mangrove root appears to produce about as much organic matter per day as was observed in a m2 column of phytoplankton in moderately rich tropical lagoons.--Copyright 1975, Biological Abstracts, Inc.
W78-05161

THE ANALYSIS AND CONTROL OF VOLATILE HYDROCARBON CONCENTRATIONS (E.G. BENZENE) DURING OIL BIOASSAYS,
Skidway Inst. of Oceanography, Savannah, GA.
For primary bibliographic entry see Field 5A.
W78-05162

RESPONSE OF SELENASTRUM CAPRICORNUTUM TO ZINC SULFIDES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
A. C. Hendricks.
Journal Water Pollution Control Federation, Vol. 50, No. 1, p 163-168, 1978. 7 fig, 2 tab, 13 ref.

Descriptors: *Toxicity, *Oxygen, *Zinc, *Dissolved oxygen, *Photosynthetic oxygen, *Algae, *Sulfides, *Nutrients, *Photosynthesis, Bioassay, Chemical analysis, Metals, Sulfur compounds, Selenastrum, Oxygen production, Zinc sulfide, Antagonism.

Oxygen production by Selenastrum capricornutum was measured after exposure to zinc, sulfide, and zinc plus sulfide. Oxygen production was decreased by 50% at 1.0 mg/l and 2.5 mg/l of zinc and sulfide, respectively. When zinc and sulfide were added together at a 2.0 ratio the oxygen production was at or near the oxygen production of the control even with zinc and sulfide concentrations of 5 and 2.5 mg/l, respectively. The two ions demonstrated an antagonism that reduced their toxic effects. (Deal)
W78-05163

SEA-WATER CHLORINATION AND THE SURVIVAL AND GROWTH OF THE EARLY DEVELOPMENTAL STAGES OF PLAICE, PLEURONECTES PLATESSA L., AND DOVER SOLE, SOLEA SOLEA (L.),
Ministry of Agriculture, Fisheries and Food, Port Erin (England). Fisheries Lab.
R. Alderson.
Aquaculture. 4(1), p 41-53, 1974.

Descriptors: Embryonic growth stage, Fish, Sea water chlorination, *Chlorination, *Dover sole, Growth rates, *Plaice, Pleuronectes-platessa, *Sole, Solea-solea, Sublethal limit, Water pollution effects.

The response of the developmental stages tested was examined under constant flow conditions using direct electrolysis of sea water as a source of chlorine. From LC50 determinations, the eggs of plaice were found to be more tolerant than the newly-hatched larvae, and for both plaice and Dover sole the tolerance of the larvae increased as their development proceeded up to metamorphosis. Less change in tolerance was evident with increasing size of fish after metamorphosis. Determinations of time to kill 50% of a test population showed that at chlorine concentrations only slightly higher than LC50 level the time for survival was considerably reduced. Growth of the metamorphosed fish of both species at sub-lethal levels only showed a very marked depression at concentrations very close to the LC50 level. There was some evidence of acclimation to chlorine during long exposure. The growth of fish in power station effluents should not be affected by the use of low level chlorination as an anti-fouling measure, since the chlorine is normally rapidly absorbed by reactions taking place in the sea water. Large fluctuations in the chlorine dose could however present a hazard.--Copyright 1975, Biological Abstracts, Inc.
W78-05164

THE PRE-SKELETAL PHASE OF CHRONIC FLUORIDE INTOXICATION.
Fluoride. 7(3), p 118-122, 1974.

Descriptors: *Toxicity, Lethal limit, Trace elements, *Human diseases, Public health, *Fluoridated water, *Fluorides, Reviews, Stomatitis, Water pollution effects.

Few investigators have paid attention to the systemic effects of flouride in chronic poisoning. In contrast to acute fluoride intoxication from large (drug) doses of fluoride, trace amounts as in fluoridated water can have a sustained effect on the gastrointestinal tract in persons who are susceptible to poisoning by it. Symptoms such as nausea, vomiting, bowel disturbances and frequent ulcers of the mouth (stomatitis) appear to be the most common feature. With the expanding role of fluoride in industry, its special significance as an air pollutant and its increasing occurrence in food in drinks, an awakening to the clinical aspect

of chronic fluoride poisoning will occur.--Copyright 1975, Biological Abstracts, Inc.
W78-05165

REPOPULATION AFTER A FISH KILL IN MUD CREEK, WASHINGTON COUNTY, ARKANSAS FOLLOWING PESTICIDE POLLUTION,
Duke Power Co., Huntersville, NC. Environment Lab.
For primary bibliographic entry see Field 5G.
W78-05166

DECHLORINATION OF WATER FOR FISH CULTURE: COMPARISON OF THE ACTIVATED CARBON, SULFITE REDUCTION, AND PHOTOCHEMICAL METHODS,
Wisconsin Univ.-Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 5G.
W78-05167

DISTRIBUTION OF PURPLE PHOTOSYNTHETIC BACTERIA IN WETLAND AND WOODLAND HABITATS OF CENTRAL AND NORTHERN MINNESOTA,
Minnesota Univ., St. Paul. Dept. of Botany.
M. E. Burke, E. Gorham, and D. C. Pratt.
J Bacteriol. 117(2), p 826-833, 1974.

Descriptors: *Bacteria, *Distribution, Habitats, *Minnesota, *Photosynthetic bacteria, Rhodopseudomonas-viridis, Wetlands, Woodlands, *Sulfur bacteria, Soil analysis.

Enrichment cultures for purple nonsulfur and sulfur photosynthetic bacteria were prepared for soil samples collected in central and northern Minnesota. The purple nonsulfur bacteria were found in most wetland soils sampled but were uncommon in woodland and grassland soils. The pH range of the soils in which these bacteria occurred was 3.8-7.8 and the oxidation-reduction potential (Eh) ranges was +510 to -65 mV. Soils with a pH below 5.0 or an Eh above +370 mV had a few purple nonsulfur bacteria (< 10/g of soil). Rhodopseudomonas viridis, a photosynthetic bacterium containing bacteriochlorphyll b, and the purple sulfur bacteria were common only in low-acidity wetland soils that were usually being reduced.--Copyright 1974, Biological Abstracts, Inc.
W78-05168

AQUACULTURE IN THERMAL EFFLUENTS FROM POWER PLANTS,
Public Service Electric and Gas Co., Newark, NJ.
C. R. Guerra, B. L. Godfriaux, A. F. Eble, and N. E. Stolpe.
10th European Symposium on Marine Biology, Ostend, Belgium. Vol. 1, p. 189-205, 1975. 4 fig, 4 tab, 19 ref.

Descriptors: *Shrimp, *Commercial shellfish, *Shellfish farming, *Rainbow trout, *Aquiculture, *Powerplants, *Cooling water, *Thermal pollution, *Thermal powerplants, *Animal metabolism, *Animal growth, Water temperature.

This paper reviews certain factors which determine the usefulness, potential and limitations of thermally assisted artificial culture of aquatic organisms: thermal aquaculture. It describes the highlights of thermal aquaculture experiments being carried out at a power generating station and presents conceptual designs of thermal aquaculture systems which would be integrated with power station condenser cooling systems. (Katz)
W78-05169

THE EFFECTS OF ZINC ON THE CARDIAC AND VENTILATORY RHYTHMS OF RAINBOW TROUT (SALMO GAIRDNERI, RICHARDSON) AND THEIR RESPONSES TO ENVIRONMENTAL HYPOXIA,
Bristol Univ. (England). Research Unit for Comparative Animal Respiration.
G. M. Hughes, and R. J. Adeney.
Water Research, Vol. 11, p 1069-1077, 1977. 8 fig, 1 tab, 24 ref.

Descriptors: *Zinc, *Heavy metals, *Fish physiology, *Toxicity, *Respiration, *Oxygen requirements, *Rainbow trout, *Biological membranes, *Membrane processes, Water pollution effects, Bioassay, *Heart rate.

Recordings were made of the cardiac and ventilatory rhythms of rainbow trout subjected to solutions of 40 to 10 ppm zinc in an experimental circulation. The higher concentration produced clearly-defined increases in ventilatory and coughing frequency and a decrease in heart rate. It was concluded that zinc interferes with some of the mechanisms involved in the uptake of oxygen at the gills and consequently can significantly affect the ability of the fish to respond to the additional stress of oxygen lack in its environment. (Katz)
W78-05170

COMPARATIVE SHORT-TERM TOLERANCE OF ZEBRAFISH, FLAGFISH, AND RAINBOW TROUT TO FIVE POISONS INCLUDING POTENTIAL REFERENCE TOXICANTS,
Guelph Univ. (Ontario). Dept. of Zoology.
A. Fogels, and J. B. Sprague.
Water Research, Vol. 11, p. 811-817, 1977. 1 tab, 51 ref.

Descriptors: *Poisons, *Toxicity, *Bioassay, *Lethal limit, Resistance, *Rainbow trout, *Phenols, Fish physiology, Animal metabolism, *Sodium compounds, *Copper sulfate, Water pollution effects, Organic compounds, Methodology, *Picloram, *DSS, *Zebrafish, *Flagfish, Reference toxicant, Sodium pentachloro phenate, Dodecyl sodium sulfate.

Zebrafish (Brachydanio rerio) and flagfish (Jordanella floridae) were evaluated as potential standard species for aquatic bioassays in Canada by comparing their short-term tolerance to that of rainbow trout (Salmo gairdneri). When threshold or 10-day LC50's for rainbow trout were assigned a value of 1.0, corresponding values for zebrafish and flagfish were respectively: copper sulfate, 1.6, 7.2; sodium pentachloropenate, 4.7, 7.6; phenol, 2.5, 3.1; picloram, 1.6, 0.55; and dodecyl sodium sulfate, 2.8, 2.4. On the average, zebrafish were 2.6 times as tolerant at trout, and flagfish 4.2 times. As a reference toxicant, sodium pentachlorophenate presented difficulties with analysis and availability. Dodecyl sodium sulfate showed no threshold of acute lethality for trout and 5-yr-old DSS had about one-third the toxicity of 1-year old DSS. Phenol met all criteria for a reference toxicant. (Katz)
W78-05173

THE EFFECTS OF DEPRESSED PH ON OOGENESIS IN FLAGFISH JORDANELLA FLORIDAE,
Concordia Univ., Montreal (Quebec). Dept. of Biological Sciences.
S. M. Ruby, J. Aczel, and G. R. Craig.
Water Research, Vol. 11, p. 757-762, 1977. 10 fig, 3 tab, 15 ref.

Descriptors: *Hydrogen ion concentration, *Fish eggs, *Fish physiology, *Reproduction, *Growth rates, *Growth stages, *Cytological studies, *Industrial wastes, *Acidic water, Water pollution effects, Bioassay, Laboratory tests, *Oocytes, *Flagfish.

Mature female flagfish were continuously exposed to pH levels of 6.7, 6.0, 5.5, 5.0 and 4.5 during a 20-d period. Quantitative histological analysis of oocyte numbers in six arbitrarily assigned stages of development indicates that the ability of oocytes to form mature eggs is reduced at all pH values tested to 20.7, 15.8, 2.1 and 8.2%, respectively, when compared with control. This reduction is primarily produced by the loss of ability of oocytes to deposit secondary yolk within the cytoplasm. (Katz)
W78-05174

POLYCHLOROBORNANE COMPONENTS OF TOXAPHENE: STRUCTURE-TOXICITY RELATIONS AND METABOLIC REDUCTIVE DECHLORINATION,
California Univ., Berkeley. Dept. of Entomological Sciences, Pesticide Chemistry and Toxicology.
M. A. Saleh, W. V. Turner, and J. E. Casida.
Science, Vol. 198, p. 1256-1258, 1977. 1 fig, 1 tab, 24 ref.

Descriptors: *Toxicity, *Chlorination, *Animal metabolism, *Fish physiology, *Animal physiology, *Chlorine, *Insecticides, *Biodegradation, *Chlorinated hydrocarbon pesticides, Gas chromatography, *Toxaphene, *Polychlorobornane, *Biotransformation, *Photolysis.

2,2,5-endo,6-exo,8,9,10-Heptachlorobornane and four derivatives of the heptachlorobornane, with an additional chlorine atom at position 3-exo,8,9, or 10, account for a major portion of the acute toxicity of toxaphene and for up to 23 percent of toxaphene composition as analyzed by open tubular column gas-liquid chromatography with an electron capture detector. Both in several organisms and model environmental systems and on photolysis, this heptachlorobornane undergoes facile reductive dechlorination at the geminal-dichloro group and sometimes dehydrochlorination. (Katz)
W78-05175

BIOTRANSFORMATION AND ELIMINATION OF THE HERBICIDE DINITRAMINE IN CARP,
Fish and Wildlife Service, La Crosse, WS. Fish Pesticide Research Div.
L. E. Olson, J. L. Allen, and J. W. Hogan.
Agricultural and Food Chemistry, Vol. 25, No. 3, p. 554-556, 1977. 1 fig, 2 tab, 7 ref.

Descriptors: *Biodegradation, *Carp, *Herbicides, *Pesticides, *Animal metabolism, *Fish physiology, *Nitrogen compounds, Gas chromatography, Biochemistry, Bioassay, Laboratory tests, Water pollution effects, Path of pollutants, Biotransformation, Tissue analysis, *Bile, *Dinitramine, *Liver.

Carp exposed to 1 mg/l dinitramine for 12-h accumulated the herbicide. After the fish were held in fresh water for 7 days, samples of plasma, muscle and gall bladder bile contained 6, 25, and 7%, respectively, of the concentration found immediately after exposure. Metabolites were not found in plasma or muscle, but deethylated dinitramine was present in the gall bladder. Biotransformation by dealkylation thus occurred in the liver. (Katz)
W78-05176

AQUATIC TOXICOLOGY: A NEW ELEMENT IN THE SAFETY TESTING OF SURFACTANTS,
Water Pollution Research Lab., Stevenage (England).
J. S. Alabaster.
The Journal of the American Oil Chemists' Society, Vol. 55, p. 181-184, 1978. 2 fig, 27 ref.

Descriptors: *Surfactants, *Toxicity, *Safety, *Biodegradation, Animal metabolism, Fish physiology, Methodology, *Testing procedures, *Alkylbenzene sulfonate, *Sewage treatment, Aquatic environment, Rainbow trout, Toxicity, Methodology, Bioassays, Environmental effects, Aquatic toxicology, Preliminary screening test procedures, Biological treatment process, LAS, Linear alkyl sulfonates.

Aquatic toxicology is becoming increasingly important in assessing the risks from environmental contamination by surfactants. Recent work by the Water Research Centre and others is discussed to show that: (a) there is a need for flexibility in approach even for preliminary screening test procedures and for toxicity tests to be relevant to field situations; (b) where linear chain surfactants pass through a normal biological treatment process these are readily biodegraded and reduced in toxicity, and in these circumstances toxicity tests should be made using biodegraded materials; (c) methods of analysis currently used overestimate the acute toxicity of surfactants to fish. (Katz)
W78-05177

EFFECT OF EXPOSURE TIME AND COPPER CONCENTRATION ON REPRODUCTION OF THE FATHEAD MINNOW (PIMEPHALES PROMELAS),
Environmental Research Lab.-Duluth, Cincinnati, OH. Newtown Fish Toxicology Station.
Q. Pickering, W. Brungs, and M. Gast.
Water Research, Vol 11, pp 1079-1083, 1977. 4 tab, 15 ref.

Descriptors: *Copper, *Fish eggs, *Fish reproduction, Fish physiology, *Minnows, *Spawning, *Fertility, *Toxicity, Reproduction, Growth rates, Bioassay, Fecundity, Metals, Path of pollutants, Water pollution effects, Prespawning exposure, Fathead minnow, Pimephales promelas.

Three concurrent studies were conducted to determine the chronic effect of prespawning exposure to various concentrations of copper on fathead minnow reproduction. Copper was introduced into the three exposure systems to give 6-, 3-, and 0-months exposure prior to spawning. Prespawning exposure time had not significant effect on reproduction. Number of eggs produced per female decreased, however, with increase in copper concentrations. (Katz)
W78-05178

FACTORS AFFECTING THE SEASONAL ABUNDANCE, COMPOSITION AND DIVERSITY OF FISHES IN A SOUTHEASTERN NEW ENGLAND ESTUARY,
Southeastern Massachusetts Univ., North Dartmouth.
For primary bibliographic entry see Field 2L.
W78-05179

SIGNIFICANCE OF HYPOCHLOROUS ACID IN FREE RESIDUAL CHLORINE TO THE AVOIDANCE RESPONSE OF SPOTTED BASS (MICROPTERUS PUNCTULATUS) AND ROSYFACE SHINER (NOTROPIS RUBELLUS),
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
D. S. Cherry, S. R. Larrick, K. L. Dickson, R. C. Hoehn, and J. Cairns, Jr.
Journal of the Fisheries Research Board of Canada, Vol 34, p 1365-1372, 1977. 3 fig, 2 tab, 20 ref.

Descriptors: *Chlorine, *Acids, *Water temperature, *Fish behavior, *Bass, *Shiners, *Sunfishes, Water quality, Water properties, Chemistry, Water chemistry, Laboratory tests, Water pollution effects, *Avoidance response(Fish), *Hypochlorous acid, Free Residual chlorine, Micropterus punctulatus, Notropis rubellus, Rosyface shiner, Spotted bass.

The spotted bass and rosyface shiner when exposed to successively doubling doses of total residual chlorine (TRC) from 0.025 to 0.80 mg/l, generaliy avoided higher concentrations when acclimated and tested at five temperatures from 6 to 30C. Both species avoided 0.05 mg/l TRC when acclimated and tested at 6C and avoided 0.20 mg/l TRC at 24 and 30C. Variations in avoidance of the free resedual chlorine (FRC) ranged from 0.017 to 0.091 mg/l (0.05 to 0.20 mg/l TRC) between 6 and 30C. After the initial avoidance response, the rosyface shiner continued to avoid the remaining higher residual levels, while spotted bass showed less avoidance or none at all. The same behavioral responses occurred when each species was exposed to a single concentration (0.05 or 0.10 mg/l TRC) for three successive 10-min observations. The avoidance response was most closely associated with the calculated hypochlorous acid (HOCl) fraction of the TRC, which declined (relative to the percent of TRC) as the pH and acclimation temperature increased. Avoidance to HOCl occurred between 0.012 mg/l (6C) and 0.031 mg/l (30C) when TRC was between 0.05 and 0.20 mg/l, respectively. Avoidances did not occur at the 12 and 18C acclimation temperatures until the HOCl threshold level (0.012-0.014 mg/l) calculated for 0.05 mg/l TRC at 6C. The HOCl content may be the most important constituent within the TRC to influence the avoidance response of fish in unpolluted aquatic systems. (Klein)
W78-05200

5D. Waste Treatment Processes

DECISION STRUCTURE FOR ASSESSMENT OF THE ECONOMIC IMPACT OF WATER QUALITY STRATEGIES IN AN INDUSTRIAL WATERSHED,
Wisconsin Univ.-Madison Dept. of Real Estate and Urban Land Economics.
For primary bibliographic entry see Field 5G.
W78-04701

LAND APPLICATION OF SEWAGE SLUDGE: V. CARBON DIOXIDE PRODUCTION AS INFLUENCED BY SEWAGE SLUDGE AND WOOD WASTE MIXTURES,
Nigeria Univ., Nsukka. Dept. of Soil Microbiology.
For primary bibliographic entry see Field 5E.
W78-04717

PHOSPHORUS REMOVAL AND WATER QUALITY IMPROVEMENTS IN GRAVENHURST BAY, ONTARIO,
M. F. P. Michalski, K. H. Nicholls, and M. G. Johnson.
Verh. Internat. Verein. Limnol., Vol. 19, p 644-659, October 1975. 10 fig, 3 tab, 34 ref.

Descriptors: *Gravenhurst Bay(Ont. Canada), *Phosphorus, *Nutrient removal, *Stratification, *Phytoplankton, Ontario(Canada), Canada, Nutrients, Chlorophyll, Algae, Water management(Applied), Eutrophication, Waste treatment, Waste disposal, Muskoka Lake(Ont Canada), Cyanophyta, Thermocline, Euphotic zone, Water pollution control.

Effects of 90% phosphorus removal from waste treatment plant effluent on phytoplankton growth were studied before and after removal was initiated in August 1971 on effluent into Gravenhurst Bay of Muskoka Lake, Ontario, Canada. It is concluded that significant improvements in water quality resulted from the program. Ice-free mean Secchi disk visibilities improved from an average of 2.5 m (1969-71) to 3.2 m (1972-73), reflecting a diminution of suspended material. In 1969 the euphotic zone was situated above the metalimnion; by 1973 this zone extended to the lower metalimnion and into the upper hypolimnion, an indication of the effects of improved light penetration following reductions in phosphorus loading to the bay. Downward movement of the metalimnion in late summer and fall characterized the thermal regime of the bay each year. Excessive algal growths have not developed during summer months of the post-phosphorus removal period, whereas previously recreational activity and water treatment supply operations were impaired. Chlorophyll-a levels reached 82 micrograms/l on 15 July 1971, but consistent patterns were not observed from 1969-73. Phytoplankton standing stocks did not show definite patterns from 1969-71, but the mean areal standard unit value dropped from 2,717 in 1969-71 to 1,406 in 1972-73. (Lynch-Wisconsin)
W78-04772

BIOLOGICAL DENITRIFICATION OF NITRATE WASTE SOLUTIONS,
Union Carbide Corp., Oak Ridge, TN. Nuclear Div.
F. E. Clark, H. C. Francke, and J. W. Strohecker.
Available from the National Technical Information Service, Springfield, Va 22161 as Y-DA-6106, Price codes: A03 in paper copy, A01 in microfiche. Report Y-DA-6106, Reprint from 30th Annual Purdue Industrial Waste Conference, Purdue University, West Lafayette, Indiana, May 6-8, 1975. 34 p, 12 fig, 3 tab, 10 ref. W.7405 eng 26.

Descriptors: *Denitrification, *Biological treatment, *Waste water treatment, *Nitrates, *Uranium purification, Nitric acid, Water pollution control, Streams, Groundwater, Bacteria, Union Carbide Corporation, Oak Ridge Y-12 Plant(TN), NPDES, Recycling.

Evaluation of alternative methods for disposal of high-nitrate wastes from uranium purification at Union Carbide Corporation's Oak Ridge, Tennessee Y-12 Plant (operated for the U.S. Energy Research and Development Administration) led to adoption of a system for recycling usable chemicals and biodenitrification of the rest. For the last 20 years liquid waste has been pumped into four one-acre ponds for evaporation and percolation into the soil. Nitrogen concentrations in a nearby creek were kept below 20 mg/cu dm, but recent changes in water pollution laws and creation of the National Pollutant Discharge Elimination System (NPDES) required that use of the ponds be discontinued to improve wate quality in the creek and eliminate the danger of nitrate pollution of groundwater. Disposal methods investigated were: (1) neutralization with lime and calcination; (2) neutralization with lime lime and conversion to liquid or solid fertilizer; (3) neutralization with lime followed by biodenitrification; and (5) recovery and recycling usable chemicals and biodenitrification of the remainder. Methods 1-3 were rejected because of expense, pollution dangers, or troublesome side products, and because of the quantity of nitrate ion involved method 5 was selected over method 4. Under the new process, nitric acid will be recovered by distillation, and aluminum nitrate nanohydrate by crystallization, with only the mother liquor denitrified biologically by bacteria. (Lynch-Wisconsin)
W78-04783

THE EDGE OF THE ARROWHEAD,
Minnesota Marine Advisory Service, Duluth. Office of Sea Grant.
For primary bibliographic entry see Field 2H.
W78-04784

EVALUATION OF MEMBRANES FOR WATER POLLUTION CONTROL,
Massachusetts Univ., Amherst. Dept. of Chemical Engineering.
W. L. Short, and E. E. Lindsey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 353, Price codes: A04 in paper copy, A01 in microfiche. Massachusetts Water Resources Research Center, Amherst, Publication No. 79, June 1976, 53 p, 6 fig, 8 tab, 27 ref. OWRT A-057-MASS(1), 14-31-0001-3821.

Descriptors: *Membrane processes, Filtration, Water pollution control, Water quality control, Water treatment, *Recycling, Coagulation, *Waste water treatment, Membranes, Sludge treatment, Separation techniques, *Aluminum sulfate.

An ultra-filtrative alum (aluminum sulfate) recovery and recycling process using synthetic polymeric membranes at low pressure differentials is economical and effective. The quality of the treated water produced by coagulation with the recycled alum as measured by turbidity and color does not suffer when using the optimum dose established by tests with fresh alum. The alum may be recycled four times if the membrane is periodically cleansed with an alkali (sodium hydroxide). An additional advantage is that the volume of sludge is greatly reduced and the remaining sludge is dewaterable. Efforts to attach a cleaning enzyme to the membrane and to use polyethylene and polystyrene as separation membranes were unsuccessful. (Lefferts-Mass)
W78-04813

MANAGEMENT OF MAN-MADE EUTROPHICATION: THE SWEDISH CONCEPT,
Association of Swedish Chemical Industries, Stockholm (Sweden).
For primary bibliographic entry see Field 5G.
W78-04917

MANUAL: RESEARCH AND DEMONSTRATION OF IMPROVED SURFACE MINING TECHNIQUES FOR THE EASTERN KENTUCKY COAL FIELDS.
Kimball (L. Robert) Consulting Engineer, Lexington, KY.
For primary bibliographic entry see Field 5G.
W78-05013

LABORATORY MEASUREMENTS OF RADIANCE AND REFLECTANCE SPECTRA OF DILUTE SECONDARY-TREATED SEWAGE SLUDGE,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-05016

5E. Ultimate Disposal Of Wastes

WELL INJECTION INTO A TWO-PHASE FLOW FIELD: A HELE-SHAW MODEL INVESTIGATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
J. A. Williams.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 197, Price codes: A03 in paper copy, A01 in microfiche. Technical Report No. 108, May 1977. 37 p, 17 fig, 3 tab, 12 ref. OWRT B-043-HI(2), 14-34-0001-6012.

Descriptors: *Injection wells, *Waste water disposal, *Saline water-freshwater interfaces, *Two-phase flow, *Mathematical models, Hawaii, Simulation analysis, Interfaces, Water pollution sources, Path of pollutants, Model studies, *Hele-Shaw model, Hubbert's force potential, Waimanalo, Oahu(Hawaii).

A Hele-Shaw model was employed in conducting preliminary studies of waste water injection into a fresh-saine water system. Three different field conditions were simulated: injection under static conditions, injection into an ambient flow field without a fresh-saline water interface, and injection into an ambient flow field with a fresh-saline water interface. Both single and double-well injections were studied for the latter case of injection in the presence of an interface. The density of the saline water was 1.026 g/cm2 for the majority of the tests while that of the injected fluid was 1.0005 g/cm3. The test results indicate that when injection is below the fresh-saline water interface, the injected fluid, under the action of the bouyant forces, rises through a relatively narrow, vertical channel to the interface and then spreads laterally along that surface. The distance increases with the distance below the interface at which injection takes place. Consequently, injection at or above the interface appears to be preferable to injection below the interface from an economic as well as a pollution standpoint. The general behavior of the injected-ambient flow field as observed in the two-dimensional Hele-Shaw model is consistent with that observed in a three-dimensional, sand-filled, hydraulic model.
W78-04709

LAND APPLICATION OF SEWAGE SLUDGE: V. CARBON DIOXIDE PRODUCTION AS INFLUENCED BY SEWAGE SLUDGE AND WOOD WASTE MIXTURES,
Nigeria Univ., Nsukka. Dept. of Soil Microbiology.
N. N. Agbim, B. R. Sabey, and D. C. Markstrom.
Journal of Environmental Quality, Vol 6, No 4, p 446-451, October-December, 1977. 6 fig, 4 tab, 20 ref.

Descriptors: *Sewage sludge, *Sludge disposal, *Wood wastes, *Land use, *Carbon dioxide, Microbial degradation, Decomposing organic matter, Nitrogen cycle, Organic wastes, Waste disposal, Recycling, Waste water treatment.

Studies were conducted to examine the effect of different proportions and rates of application of wood residues and sludge on the rate of CO2 production. Wood, bark, and a wood-bark mixture from Engelmann spruce were added to anaerobically digested sludge in varying proportions. Each mixture was applied to a clay loam at a rate of 22.4-224 metric tons/ha. The carbon oxidation rate was assessed using carbon dioxide production over a period of 367 days. Generally, carbon dioxide production increased as application rate increased, but the increase was not additive for most of the time intervals. At higher application rates, carbon dioxide accumulation increased as the percentage of wood and bark materials increased up to 75% bark or wood material, then dropped 100% wood material. Laboratory incubation and greenhouse studies attempted to correlate carbon dioxide production with N mineralization. Microbial respiration was considered a suitable index of plant-available nitrogen in soil, except in cases where nutrients were deficient because of microbial immobilization or where toxic substances limited microbial activity. (See also W77-07079 and W76-10841) (Snyder-FIRL)
W78-04717

EFFECTS OF LAND TREATMENT ON THE AQUATIC ENVIRONMENT,
Illinois Univ. at Urbana-Champaign. Dept. of Ecology, Ethology, and Evolution.
For primary bibliographic entry see Field 5G.
W78-04732

WATER QUALITY DATA DURING SEPTEMBER 16-19, 1974 AT SILVER BAY, SAWMILL COVE, AND EASTERN CHANNEL, SITKA, ALASKA.
Environmental Protection Agency, Seattle, WA. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5A.
W78-04756

BIOLOGICAL DENITRIFICATION OF NITRATE WASTE SOLUTIONS,
Union Carbide Corp., Oak Ridge, TN. Nuclear Div.
For primary bibliographic entry see Field 5D.
W78-04783

THE EDGE OF THE ARROWHEAD,
Minnesota Marine Advisory Service, Duluth. Office of Sea Grant.
For primary bibliographic entry see Field 2H.
W78-04784

NUTRIENTS AND THEIR INFLUENCE ON THE ALGAE IN THE STOCKHOLM ARCHIPELAGO DURING 1970. NO. 6, EFFECTS OF SEWAGE WATER ON BENTHIC VEGETATION,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 5C.
W78-04793

EFFECT OF SPRAY IRRIGATION OF MUNICIPAL WASTEWATER ON SOIL INVERTEBRATE POPULATIONS AND THE POTENTIAL INFLUENCE ON PHYSICAL FACTORS OF SOIL,
State Univ. of New York Coll. of Environmental Science and Forestry. Dept. of Environmental and Forestry Biology.
For primary bibliographic entry see Field 5C.
W78-04818

DEVELOPMENT OF MODELS FOR PREDICTION OF SHORT-TERM FATE OF DREDGED MATERIAL DISCHARGED IN THE ESTUARINE ENVIRONMENT,
Tetra Tech, Inc., Pasadena, CA.
For primary bibliographic entry see Field 5B.
W78-04854

TRACE METALS IN SCALLOPS FROM WITHIN AND AROUND TWO OCEAN DISPOSAL SITES,
Environmental Protection Agency, Narragansett, RI.
For primary bibliographic entry see Field 5C.
W78-04887

ANALYSIS OF BRINE DISPOSAL IN THE GULF OF MEXICO. 1. BRYAN MOUND,
National Oceanic and Atmospheric Administration, Washington, DC. Environmental Data Service.
For primary bibliographic entry see Field 5G.
W78-04963

ANALYSIS OF BRINE DISPOSAL IN THE GULF OF MEXICO. 2. WEST HACKBERRY,
National Oceanic and Atmospheric Administration, Washington, DC. Environmental Data Service.
For primary bibliographic entry see Field 5G.
W78-04964

ANALYSIS OF BRINE DISPOSAL IN THE GULF OF MEXICO. 4. BIG HILL.
National Oceanic and Atmospheric Administration, Washington, DC. Environmental Data Service.
For primary bibliographic entry see Field 5G.
W78-04965

TRACE METALS IN ORGANISMS FROM OCEAN DISPOSAL SITES OF THE MIDDLE EASTERN UNITED STATES,
National Marine Fisheries Service, Milford, CT. Milford Lab.
For primary bibliographic entry see Field 5A.
W78-05059

HEAVY METALS FROM WASTE DISPOSAL IN CENTRAL PUGET SOUND,
Washington Univ., Seattle. Lab. of Radiation Ecology.
For primary bibliographic entry see Field 5B.
W78-05073

GRANULATION OF COMPLEX FERTILIZERS CONTAINING AMMONIUM SULFATE BY MELT TECHNOLOGY,
Ferguson Industries, Dallas, TX.
For primary bibliographic entry see Field 5G.
W78-05118

CHEMICAL DEGRADATION OF MILITARY STANDARD FORMULATIONS OF ORGANOPHOSPHATE AND CARBAMATE PESTICIDES I. CHEMICAL HYDROLYSIS OF DIAZINON,
Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD.
For primary bibliographic entry see Field 5B.
W78-05120

5F. Water Treatment and Quality Alteration

EVALUATION OF MEMBRANES FOR WATER POLLUTION CONTROL,
Massachusetts Univ., Amherst. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W78-04813

THE PRE-SKELETAL PHASE OF CHRONIC FLUORIDE INTOXICATION.
For primary bibliographic entry see Field 5C.
W78-05165

5G. Water Quality Control

DECISION STRUCTURE FOR ASSESSMENT OF THE ECONOMIC IMPACT OF WATER QUALITY STRATEGIES IN AN INDUSTRIAL WATERSHED,
Wisconsin Univ.-Madison Dept. of Real Estate and Urban Land Economics.
C. E. Stanley, and R. A. Erickson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 156, Price codes: A09 in paper copy, A01 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report, WIS WRC 77-07, 1977. 167 p, 10 fig, 7 tab, 58 ref, 6 append. OWRT B-095-WIS(1), 14-34-0001-6133.

Descriptors: *Alternative costs, *Cost analysis, *Econometrics, *Economic impact, Management, *Estimating, *Forecasting, Statistical methods, *Statistical models, Water quality control, Wisconsin, *Decision making, Watershed management, Industrial water, Cities, Milwaukee Area Regional Economy(Wisc).

The objective was to develop a decision structure that would trace the impact of water quality decisions through to the economic effect on an industrial watershed and its contained metropolitan economic system. The basic design and some of the results of initial testing of the model are described. Residuals management models for environmental analysis are reviewed with particular attention given to industrial residuals generation and the impacts of pollution abatement strategies. The Milwaukee metropolitan study region is described, water quality monitoring efforts discussed and major polluting industries are identified. Treatment costs for plants and industries are derived based on present municipal treatment costs and prospective marginal cost municipal treatment. A linear prgramming model is then applied to the beer-producing industry to determine the likely response to abatement costs incurred at current operating levels if effluent restrictions are met. At the macroeconomic level, a 96-equation econometric model of the Milwaukee area (MEM), providing forecasts of key variables through 1985, was designed, constructed and tested. The linkages between the reactions of firms in response to abatement costs and the aggregate effects on the regional economy are discussed and tested. Legislation effects and directions for future research are discussed.
W78-04701

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE WATER: PART I. SOIL-WATER QUALITY AND VEGETATIVE RESPONSES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
E. J. Ciolkosz, L. T. Kardos, R. C. Cronce, and E. R. Stein.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 161, Price codes: A11 in paper copy, A01 in microfiche. Institute for Research on Land and Water Resources, University Park, Completion Report, January, 1978. 227 p, 69 tab, 27 fig, 74 ref, 4 append. OWRT B-086-PA(1) (Part I), 14-34-0001-6114.

Descriptors: *Acid mine water, Water, Soils, Irrigation, Fescues, Flood plains, Hydrogen ion concentration, Total acidity, Conductivity, *Mine drainage, *Water pollution control, *Vegetation regrowth, Liming, *Feasibility studies, *Revegetation, Soil water, *Soil water quality, Vegetative responses, Renovation, Ryegrass.

This study determined the feasibility of using soil as a medium for the renovation of acid mine drainage water. The effects of liming and three levels of irrigation with acid water were studied. Acid water from a stream was applied weekly at three levels to an unlimed and a limed floodplain soil. Soil water samples were collected weekly. The soil water samples and the acid water applied were analyzed for pH, total acidity, conductivity, Al, Fe, Mn, SO4, Ca, Mg, K, and Na. Perennial ryegrass and tall fescue were planted in separate halves of each expermental unit. During the study, the grasses were measured for yield, height, stand density and percent cover. Both the unlimed and limed areas initially had considerable capacity for renovating the applied acid water. Liming and the weekly levels of acid water irrigation significantly affected the growth of perennial ryegrass and tall fescue. When the soil was limed, both species grew well and provided adequate cover. Without liming, both grass species were shorter, yielded less and provided less cover. In the unlimed areas, the tall fescue appeared more tolerant to the higher weekly levels of acid water irrigation than the perennial ryegrass. (See also W78-04705) (Sink-Penn State)
W78-04704

SOIL AS A MEDIUM FOR THE RENOVATION OF ACID MINE DRAINAGE WATER: PART II, SOIL PHYSICAL AND CHEMICAL CHANGES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
E. J. Ciolkosz, L. T. Kardos, R. C. Cronce, and E. R. Stein.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 162, Price codes: A08 in paper copy, A01 in microfiche. Institute for Research on Land and Water Resources, University Park, Completion Report, January, 1978. 147 p, 62 tab, 13 fig, 68 ref, 2 append. OWRT B-086-PA(1)(PartII), 14-34-0001-6114.

Descriptors: Soils, Acidic water, Soil environment, Cation exchange, Acidity, Hydrogen ion exchange, Irrigation, Soil moisture, Soil temperature, Vegetation regrowth, *Mine drainage, *Water pollution control, Loam, Soil profiles, *Soil physical properties, *Soil chemical properties, Acid mine water, Revegation, Soil parameters, Soil depth, Limed area, Renovation, Sandy loam.

Acid coal mine water was supplied to a Linden sandy loam soil at various levels. The soil data indicated that the main reactions between the applied water and the soil occurred in the upper part of the soil profile. The cation exchange capacity of the soil appeared to be the most important soil property affecting the renovation of the acid water. Th basic cations were removed from the soil in the upper part of the profile and exchanged for H and Al in the water, thus causing the acidity of the soil to increase and the pH of the water to increase. Amounts of Ca and Na in the soil decreased, while the amount of the exchange acidity, K, and Al increased from acid mine water application. The Ca:Mg ratio of the soil decreased as a result of the treatment. The soil in the irrigated areas was unsaturated; soil moisture content increased with increasing soil depth. Soil temperatures were lower in the irrigated areas than in the unirrigated areas. Apparently the better stand of vegetation in the irrigated area shaded the soil more and thus lowered its temperature. (See also W78-04704) (Sink-Penn State)
W78-04705

EFFECTS OF PHYTOPLANKTON ON DISSOLVED OXYGEN CONCENTRATION IN CATFISH PONDS,
Auburn Univ., AL. Water Resources Research Inst.
For primary bibliographic entry see Field 5C.
W78-04710

NON-POINT SOURCE POLLUTION SEMINAR, SECTION 108(A) DEMONSTRATION PROJECTS PROGRESS REPORTS, HELD AT CHICAGO, NOVEMBER 20, 1975. POLLUTION CONTROL IN GREAT LAKES.
Environmental Protection Agency, Chicago, IL. Office of the Great Lakes Coordinator.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 970, Price codes: A12 in paper copy, A01 in microfiche. Report EPA-905/9-75-007, (1975). 260 p, 66 fig, 59 tab, 67 ref. EPA G005103, G005139, G005140.

Descriptors: *Erosion control, *Sediment control, *Water quality control, *Demonstration projects, *Nonpoint pollution, Land treatment, Indiana, Wisconsin, Minnesota, Washington County Project(WI), Red Clay Project(WI, MN), Black Creek Sediment Control Project(IN), Great Lakes, Farm management, Agriculture, Grants, Water pollution control, Land use, Monitoring, Watersheds(Basins), Runoff, Planning.

Seventeen papers were presented at a one-day 'Non-Point Source Pollution Seminar,' held 20 November 1975 in Chicago, Illinois under EPA sponsorship. The seminar concentrated on three erosion and sediment control demonstration projects funded by EPA grants under section 108(a) of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500). The majority of the papers concerned the Black Creek Sediment Control Project in Allen County, Indiana; the Black Creek watershed contributes sediment and nutrients to the Maumee River, a tributary of Lake Erie. Two papers provide very preliminary planning synopses of the Red Clay Project in Wisconsin and Minnesota on the southern shore of Lake Superior, and the Washington County Project of southeastern Wisconsin. Three additional papers present judicial interpretations of PL92-500 discharge permit regulations, EPA research and development goals, and management procedures for EPA demonstration grants. The twelve Black Creek Project papers deal with the project's first two years and cover planning techniques, farmer attitudes, minimum tillage experiments, pesticide and fertilizer use in the watershed, sediment and nutrient contributions to the Maumee River, streambank stabilization experiments, sediment traps, grassed waterways, effects of land treatment on fish, computerized monitoring systems, cost analysis, and a progress report. (See W78-04720 thru W78-04736) (Lynch-Wisconsin)
W78-04719

THE CHALLENGE TO AMERICAN AGRICULTURE OF P.L. 92-500 FROM A NATIONAL VIEWPOINT - FOCUS ON 'POLITICAL

RULINGS AS THEY AFFECT NPS PROGRAMS',
Environmental Protection Agency, Washington, DC. Water Planning Div.
J. R. Churchill.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 8-11. EPA G005103, G005139, G005140.

Descriptors: *Federal Water Pollution Control Act Amendments(1972), *Agriculture, *Nonpoint pollution, *Permits, *Water pollution control, Legal aspects, Feed lots, PL 92-500, Legislation, Judicial decisions, Regulation, Point pollution, NPDES, Agricultural runoff.

Under section 402 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) discharge permits are regulated by the National Pollutant Discharge Elimination System (NPDES). Although some EPA officials feel that certain agricultural activities should be excluded form permit regulations of the NPDES, the recent Flanery decision by the Federal District Court for the District of Columbia ruled that the EPA must promulgate regulations to extend NPDES permits to include all sources in the concentrated animal feeding operation, separate storm sewer, agricultural, and silvicultural categories. Regulations for concentrated feeding oprations, published 20 November 1975 in the Federal Register, specify that a feedlot operator needs a permit if more than a certain number of animals (specified in his paper) are confined, and if measurable waste are discharged into navigable waters. EPA has said that such activities as those mentioned in the Flanery decision are best dealt with at the state and local level as part of an overall, integrated approach based on best management practices, rather than through use of permits. PL 92-500 marks the first time federal water pollution control efforts have been directed at nonpoint sources of pollution. (See also W78-04719) (Lynch-Wisconsin)
W78-04720

OVERVIEW OF RESEARCH AND DEVELOPMENT AS IT RELATES TO NONPOINT SOURCE POLLUTION,
Environmental Protection Agency, Washington, DC. Nonpoint Source Management Div.
P. R. Heitzenrater.
In: Non-Point Source Pollution Seminar, Section 108 (a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 12-16. EPA G005103, G005139, G005140.

Descriptors: *Nonpoint pollution, *Research and development, *Agriculture, *Environmental Protection Agency, EPA, Planning, Decision-making, Pollutants, Agricultural runoff, Nutrients, Costs, Benefits.

EPA's long-term agricultural goals are to increase food and fiber production with minimal environmental degradation and minimal conflict with other national goals. Major focal areas of EPA agricultural research, covering all aspects from production through harvesting, are: (1) management of waste from animal production; (2) irrigated and nonirrigated crop production; (3) alternate pest management techniques; and (4) silvicultural practices. Research objectives include: (1) mathematical simulation models to predict impact on water quality of various agricultural and silvicultural practices, as well as the effects of alternate management methods; (2) best management practice (BMP) alternatives for runoff and emission control; (3) assessment of renewable resource production trends and impact; and (4) development of integrated pest management controls to reduce the effects of agricultural pesticides. Several fundamental issues must be dealt with by planners and decision-makers in relation to nonpoint agricultural pollution: (1) measurement of source loads; (2) measurement of pollutant delivery and damage; (3) cost effectiveness of nonpoint pollution source controls; and (4) feasibility of controls implementation. Current progress in each of these areas is discussed. Whether benefits from control are worth the cost is essentially a political question. (See also W78-04719) (Lynch-Wisconsin)
W78-04721

USEPA INVOLVEMENT IN MANAGING SECTION 108(A) PROJECTS,
Environmental Protection Agency, Chicago, IL. Non-Point Source Coordinator.
C. D. Wilson, Jr.
In: Non-Point Source Pollution Seminar, Section 108 (a) Demonstration Projects Progress Reports, Held at Chicago. November 20, 1975. Report EPA-905/9-75-007, (1975). p 17-18. EPA G005103, G005139, G005140.

Descriptors: *Environmental Protection Agency, *Demonstration projects, *Nonpoint pollution, *Research and development, *Grants, EPA, Procedures, Federal Water Pollution Control Act Amendments(1972), PL 92-500, Planning.

Demonstration projects for point and nonpoint pollution sources are provided for by section 108(a) of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) under research and development provisions. All three current nonpoint pollution source projects are managed in essentially the same way through the EPA project officer. Several steps are involved: (1) the project grantee or governing board hires a local project director, who is responsible for all technical direction, guidance of the work plan, operations manual, construction plans and specifications, analytical work, plans evaluation, reports, voucher preparation, and time schedules; (2) the project officer meets with the grantee and outlines accounting procedures, preparation of plans and specifications, reports, purchases, assurances, and reimbursement; (3) all construction plans and farm plans are reviewed by the EPA project officer for approval; (4) after approval, the grantee may advertise for bids; (5) the EPA project officer, after reviewing bid tabulations and proof of advertising, approves or disapproves the awarding of construction or equipment contracts; (6) the project officer performs inspections and program reviews and provides technical assistance; (7) following completion of the project an audit is required; (8) a final report is submitted by the project director. (See also W78-04719) (Lynch-Wisconsin)
W78-04722

CONSERVATION FARM PLANNING,
Soil Conservation Service, Fort Wayne, IN.
For primary bibliographic entry see Field 4D.
W78-04723

IMPACT OF SOCIAL ATTITUDES ON MANAGING THE ENVIRONMENT,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Economics.
R. M. Brooks, and D. L. Taylor.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 26-41, 1 fig, 8 tab. EPA G005103, G005139, G005140.

Descriptors: *Social aspects, *Attitudes, *Black Creek Sediment Control Project(IN), *Amish, *Sediment control, *Surveys, Environmental control, Decision-making, Planning, Demonstration projects, Indiana, Farm management, Soil conservation, Farms, Agriculture, Nonpoint pollution, Costs, Leadership.

Opinions of 89 farmers in connection with the Black Creek Sedimentation Control Project in northeastern Allen County, Indiana, were surveyed to determine attitudes toward introduction of soil conservation practices in the area. A large Amish population, constituting about one-third (32) of the farmers, was an important factor in the study. Identification of leaders among the farmers was a major goal of the survey; eight respected, successful farmers were named as sources of agricultural advice and example by non-Amish. It was hoped that these leaders would cooperate in introducing the new sediment control methods involved in the project. Among the Amish no information on leaders was found. But it was learned that the district Bishop was very influential, and that the project could not be successful without his cooperation. A majority of the Amish felt that soil conservation was a major problem in the area, while a majority of the non-Amish felt it was not a major problem. Both groups agreed that soil erosion practices should not be borne entirely by the farmers affected, and that the federal government should play an important role in soil conservation programs. They also felt that they would benefit from the project. The non-Amish agreed that major decisions in the demonstration project should be made by technicians. (See also W78-04719) (Lynch-Wisconsin)
W78-04724

TILLAGE AND SIMULATED RAINFALL STUDIES,
Purdue Univ., Lafayette, IN. Dept. of Agronomy.
J. V. Mannering, D. R. Griffith, and C. B. Johnson.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 42-56, 12 tab, 6 ref. EPA G005103, G005139, G005140.

Descriptors: *Black Creek Sediment Control Project(IN), *Crop production, *Rainfall simulation, *Corn(Field), *Cultivation, Indiana, Demonstration projects, Soil erosion, Erosion control, Farm management, Agriculture, Sedimentation, Turn plowing, Chiseling, Disking, Sediment control.

Five methods for cultivating corn were tested on demonstration plots in 1973-74 to determine the best techniques for erosion control. Results showed that fall chiseling reduced soil losses 50-75% over conventional fall turn plowing, while producing equivalent or better yields on two of three lake plain soils. The experiments were conducted as part of the Black Creek Sedimentation Control Project in northeastern Allen County, Indiana. Three main soil groups were tested: (1) rolling upland silty with clay subsoils (Morley), Blount, Pewamo); (2) nearly-level lake plain sandy, loamy, and silty soils with clay loam subsoils, or clays under deep loams (Oshtemo, Whitaker, Rensselaer, Haskins); and (3) nearly-level lake plain soils with silt loam, clay loam, or clay surfaces and clay subsoils (St. Clair, Nappanee, and Hoytville). Cultivation systems tested were: (1) fall turn plowing and spring disking; (2) spring turn plowing with spring disking; (3) fall chiseling and spring secondary seedbed preparation; (4) light disking; and (5) no cultivation, with planting in a narrow slit. Simulated rainfall tests were conducted to ascertain sediment contributions of the soil units, and to determine effects of cultivation techniques, residue management, and crop species. Both shallow fall disking and no cultivation resulted in 25% reduction in soil losses over fall turn plowing. Shallow disking produced yields generally equivalent to chiseling or plowing, while no cultivation produced variable yields. (See also W78-04719) (Lynch-Wisconsin)
W78-04725

USES OF PESTICIDES AND FERTILIZERS IN THE BLACK CREEK WATERSHED,
Purdue Univ., Lafayette, IN. Dept. of Agronomy.
H. M. Galloway.

In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EDA-905/9-75-007, (1975). p 57-70, 12 tab. EPA G005103, G005139, G005140.

Descriptors: *Black Creek Sediment Control Project(IN), *Fertilizers, *Pesticides, *Surveys, *Amish, *Social aspects, *Farm management, Indiana, Agriculture, Farms, Water pollution control, Nonpoint pollution, Herbicides, Insecticides, Crop production.

Pesticide and fertilizer use was surveyed among 89 farmers, representing all but four farms of ten acres or more included in the Black Creek Sediment Control Project in northeastern Allen County, Indiana. Amish constituted 32 of the 89 landowners. High crop (especially) corn) and hay acreage and low pasture and woodland acreage characterize the area. Of 57 non-Amish, 47 reported moderate pesticide use, mainly herbicides; 9 of 16 Amish used pesticides. Use of insecticides is uncommon. Tables give types and application rates of herbicides used on corn and soybeans. For corn, oats, and wheat, 92-100% of all farmers use manure or fertilizer, while for soybeans (not grown by Amish) 66% of non-Amish farmers use manure or fertilizer. For hay the percentage ranges from 37% (non-Amish) to 53% (Amish), and for pasture 0% (non-Amish) to 75% (Amish). Seventeen of 28 Amish farmers with pastureland depend entirely on manure for pastures. Both Amish and non -Amish use mixed grades of fertilizer on wheat and oats; non-Amish use two or three fertilizers on corn and low amounts on more phosphorus and potassium than Amish. Analyses of total nitrogen, phosphorus, and potassium in sub-watersheds shows no striking differences between the two groups. Non-Amish tend to use two or three fertilizers as plowdown and in the row, while Amish tend to use one mixed-grade fertilizer at planting. (See also W78-04719) (Lynch-Wisconsin)
W78-04726

SEDIMENT CONTRIBUTIONS TO THE MAUMEE RIVER,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-04727

STREAM STABILIZATION,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-04728

SEDIMENT TRAP MEASURING BED LOAD MOVEMENT IN BLACK CREEK,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-04729

GRASSED WATERWAY DESIGN,
Soil Conservation Service, Kendallville, IN. Area II.
For primary bibliographic entry see Field 4D.
W78-04730

NUTRIENT CONTRIBUTIONS TO THE MAUMEE RIVER,
Purdue Univ., Lafayette, IN. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W78-04731

EFFECTS OF LAND TREATMENT ON THE AQUATIC ENVIRONMENT,
Illinois Univ. at Urbana-Champaign. Dept. of Ecology, Ethology, and Evolution.
J. R. Karr, and O. T. Gorman.

In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 120-150, 13 fig, 6 tab, 31 ref. EPA G005103, G005139, G005140.

Descriptors: *Environmental effects, *Black Creek Sediment Control Project(IN), *Ecosystems, *Fish, *Sedimentation, Demonstration projects, Ecology, Water quality, Sediment, Erosion control, Suspended solids, Streams, Forest watersheds, Forests, Universal Soil Loss Equation, Channel improvement, Watersheds(Basins), Indiana.

Biological studies carried out as part of the Black Creek Sediment Control Project in Allen County, Indiana, demonstrated that even small-scale changes in land use may have profound effects on sediment and nutrient dynamics, and on the nature of stream biota. Land treatments incorporated into the project, initiated in 1972, included such measures as agricultural modifications, stream bank reconstruction, erosion control structures, and sedimentation traps. The biological studies ranged from effects of streamside vegetation on suspended solids to fish community dynamics. Stream sampling was conducted throughout the Black Creek watershed, and Wertz Woods on Wertz Drain was selected for intensive study of intra-watershed variation caused by vegetation in fish and other factors. The various land treatments caused significant alterations in fish populations due to reductions in spawning and nursery areas. A general decline in fish numbers--particularly large fish--was noted, as well as lower maximum ages and lower growth rates. The Wertz Woods study area comprised 1800 m of stream channel, 550 m of which meanders through the mixed forest. Average suspended solids load in Wertz Drain drops from 90-95 mg/l upstream of the forest to 74 mg/l at the downstream end of the woods; as the stream flows through the forest it acts as a natural sediment basin. Increased water quality was reflected in the biota. (See also W78-04219) (Lynch-Wisconsin)
W78-04732

COMPUTER MONITORING OF ENVIRONMENTAL CONDITIONS IN A WATERSHED,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-04733

PROJECT MANAGEMENT AND LAND TREATMENT COSTS,
Allen County Soil and Water Conservation District, IN.
J. E. Lake.
In: Non-Point Source Pollution Seminar, Section 108(a) Demonstration Projects Progress Reports, Held at Chicago, November 20, 1975. Report EPA-905/9-75-007, (1975). p 162-216, 38 fig, 3 tab, append. EPA G005103, G005139, G005140.

Descriptors: *Black Creek Sediment Control Project(Ind), *Erosion control, *Costs, *Management, *Sediment control, *Farm management, Land use, Indiana, Data collections, Environmental effects, Soil conservation, Water quality, Maumee River, Agriculture, Lake Erie, Sediments, Agricultural runoff, Monitoring, Pollutants, Channel improvement, Grants, Nonpoint pollution.

Cost considerations are related project benefits for the five-year Black Creek Sediment Control Project (Allen County, Indiana), begun in 1972, which was designed to evaluate the impact of agricultural pollutants and land use modifications on water quality. Application of soil conservation and erosion control practices on private farmland, together with monitoring of their effects, is the major activity of the project. Funding of $2.5 million from the Environmental Protection Agency and local sources was obtained, of which $750,000 was budgeted for cost-sharing incentives to farmers for adoption of conservation practices. Thirty-four such measures were identified, and goals were set for each. After two years, goals meeting with the greatest success have been grade stabilization structures, stream channel stabilization, conservation cropping, critical area planting, field borders, and grassed waterways. Discouraging results have been associated with contour farming; farmstead, feedlot, and field windbreaks; land smoothing; minimum tillage; pasture and hayland planting; a sediment control basin; strip cropping; tree planting; and woodland practices. Even high cost-sharing incentives have not induced farmers to adopt several of the techniques, including minimum tillage, a conservation measure holding great potential. Management aspects and costs are discussed at length in this paper, accompanied by extensive cost data. The project was initiated after nonpoint pollution (especially sediment) was identified as the major polluter of the Maumee River, of which Black Creek is a tributary. (See also W78-04719) (Lynch-Wisconsin)
W78-04734

SYNOPSIS OF THE RED CLAY PROJECT,
Western Lake Superior Basin Erosion and Sediment Control Program, Superior, WI.
For primary bibliographic entry see Field 4D.
W78-04735

BACKGROUND, DEVELOPMENT, AND OBJECTIVES OF THE WASHINGTON COUNTY PROJECT,
Wisconsin Univ.-Madison. Dept. of Soil Sciences.
For primary bibliographic entry see Field 4D.
W78-04736

WATER QUALITY EFFECTS OF POTENTIAL URBAN BEST MANAGEMENT PRACTICES: A LITERATURE REVIEW,
Wisconsin Dept. of Natural Resources, Madison. Bureau of Water Quality.
G. L. Oberts.
Technical Bulletin No 97, 1977. 24 p, 16 tab, 121 ref. 2 append.

Descriptors: *Bibliographies, *Reviews, *Water management(Applied), *Urban runoff, *Water quality effects, Erosion control, Costs, Sewers, Storm runoff, Nonpoint pollution, California, Virginia, Urban drainage.

The literature of management approaches to control of urban is reviewed, with emphasis on analysis of water quality effects. Three basic alternative approaches to runoff control from sources as construction, streets, litter, and sewer overflow are discussed: (1) on-site source control, (2) collection and transport of runoff to a different location; and (3) treatment of runoff. Rainfall, which occurs on a predominatly impervious area, as runoff picks up sediments, nutrients, and metals and other toxicants and transports them into the stormwater receiving system. The largest concentration, on the rising side of the runoff hydrograph, is termed the 'first flush.' Source control techniques include increased infiltration, retention of runoff/reduction of erosion, reduction of contaminant deposition, and removal of contaminants. Source control is the least expensive approach, and is suitable for small, upstream basins. Collection system problems involve reduction of in-channel erosion, increase of runoff water infiltration, storage of runoff, and removal of contaminants. These systems cost more than source control, but are needed for many larger-scale problems. Treatment of discharge, including physical, chemical, biological, or mixed methods, is the most costly approach, but is often the only alternative for highly developed urban areas; the physical chemical technique is the most cost-effective. (Lynch-Wisconsin)
W78-04744

MODELING OF ACID MINE DRAINAGE AND OTHER POLLUTANTS IN THE MONOGAHELA RIVER BASIN UNDER LOW FLOW CONDITIONS,
West Virginia Univ., Morgantown. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-04746

WATER POLLUTION INVESTIGATION: CUYAHOGA RIVER AND CLEVELAND AREA,
ECO-LABS, Inc., Cleveland, OH.
For primary bibliographic entry see Field 5B.
W78-04748

WATER QUALITY ASSESSMENT FOR THE PROPOSED RDX-HMX FACILITY, MCALESTER NAVAL AMMUNITION DEPOT, VOLUME I AND II.
Water and Air Research, Inc., Gainesville, FL.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 394 and AD-A026 395, Price codes: A08 in paper copy, A01 in microfiche and A07 in paper copy, A01 in microfiche. Final Report to Army Research and Development Command, Washington, D. C. February 1976. 265 p, 35 fig, 29 tab, 115 ref, 5 append. DAMD-17-75-C-5049.

Descriptors: *McAlester Naval Ammunition Depot(OK), *RDX-HMX, *Ammunition plants, *Effluents, *Water pollution sources, *Water pollution effects, Oklahoma, Fish, Streams, Eufaula Reservoir(OK), Peaceable Creek(OK), Eutrophication, Waste water disposal, Industrial wastes, Dissolved oxygen, Nuisance algae, Low flow, Reservoirs.

A survey of chemical and biological characteristics of receiving waters of the proposed RDX-HMX facility at McAlester Naval Ammunirions Depot, Pittsburgh County, Oklahoma showed that the effluents could alter the existing biotic community. Industrial wastewater from the facility would go to Eufaula Reservoir via Chun, Peaceable, Brushy, and Gaines Creeks. The effluents would consist of (1) treated process waste water, and (2) untreated cooling water blowdown, condensate blowdown, and ion exchange regeneration water. Streamflow in receiving waters is highly variable, and during periods of sparse rainfall in late summer and early fall creeks may become dry except for intermittent pools. At those times streamflow would be composed of waste discharge from the facility. Low flows and drought are expected in Peaceable-Brushy Creek system about 5-0% of the year. In the event of treatment plant failure, raw wastewater discharged to the streams under no-flow or medium-flow conditions would cause severe dissolved oxygen (DO) deficits ot the point of anoxia, with the elimination of some species of game fish. Even with normal plant operation, critically low dissolved oxygen conditions could develop, depending on reaeration characteristics. Plant operation would result in nitrogen loading to streams and reservoir, and nuisance algal growth could occur. (Lynch-Wisconsin)
W78-04755

CHEMICALS USED TO CONTROL FISH AND AQUATIC PLANTS IN ILLINOIS, I. AN EVALUATION OF FISH TOXICANTS.
Illinois Natural History Survey, Urbana. Aquatic Biology Section.
In: Illinois Institute for Environmental Quality Document No. 75-13, June 1975. p 1-26, 4 tab, 17 ref, 2 append. 20.054.

Descriptors: *Piscicides, *Rotenone, *Antimycin, Illinois, Toxins, Environmental effects, Toxicity, Invertebrates, Water quality control, Fish control toxicants, Fish control agents, Chemcontrol.

Only two fish control toxicants, rotenone and antimycin, have been found satisfactory for general use in the United States, and along with two selective toxicants are the only piscicides registered by the Environmental Protection Agency. Piscicides are the most efficient and practicel means of eliminating undesirable fish, such as bottom-rooting fish or those competing with game species for space and food. An ideal agent should be selectively toxic only for target species, efficient over a wide range of water quality, detoxified rapidly by natural or chemical means, effective after short exposure time, nonrepellant to target species, irreversible, easy to apply, nonhazardous, and economical. Of selected fish species, rotenone is most toxic to minnows, trout, and yellow perch, and least toxic to bullheads, carp, catfish, and goldfish. Antimycin is most toxic to gizzard shad, trout, walleyes, and yellow perch, and least toxic to bullheads, bowfins, catfish, goldfish, and shortnose gar. Sixteen other fish have intermediate resistance to one or both agents. At levels lethal to fish, rotenone is toxic to several invertebrates, while antimycin is toxic to Daphnia and bullfrog tadpoles. Extensive toxicity data for other organisms is presented in tabular form. The presence of aquatic plants, springs, seepages, and silt affect piscicide efficiency, and many toxicants will not penetrate the thermocline; both rotenone and antimycin are degraded by sunlight, high temperature and high pH. (Lynch-Wisconsin)
W78-04779

CHEMICALS USED TO CONTROL FISH AND AQUATIC PLANTS IN ILLINOIS, A REVIEW OF THE AQUATIC HERBICIDES USED IN ILLINOIS,
Illinois Natural History Survey, Urbana. Aquatic Biology Section.
R. C. Hiltibran.
Illinois Institute for Environmental Quality Document No. 75-13, June 1975. p 27-82, 4 fig, 16 tab, 34 ref, 1 append. 20.054.

Descriptors: *Herbicides, *Algicide, *Illinois, *Aquatic weed control, *Algal control, Eutrophication, Copper compounds, Chemcontrol, Water quality control, Environmental effects, Toxicity, Diquat, Biochemical oxygen demand.

Characteristics and uses of aquatic herbicides and algicides currently registered by the Environmental Protection Agency are summarized; some experimental compounds are also included. Algicides include five copper and five non-copper formulations; three pre-emergent and 19 post-emergent herbicides are discussed. Tables and figures give toxicity data for fish and other aquatic organisms, diuration of diquat in natural waters, uptake of copper and diquat by bluegills, and diquat absorption by six hydrosoils. Although minimal study has been focused on changes in water quality parameters from application of herbicides, effects would probably be minimal compared with changes resulting from removal of the aquatic plants and associated biota. Plant decay would increase biological oxygen demand and could caused fish loss. Nutrient levels could also be affected, with the development of algal blooms. Interaction of aquatic herbicides and the aquatic environment, based on experiments in the field and in the laboratory with several herbicides, is also discussed. These herbicides include copper, dequat, fenac, 2,4-D, endothall, simazine, amitrole, dalapon, dichlobenil, diuron, and silvex. (Lynch-Wisconsin)
W78-04780

TAX PLANNING FOR POLLUTION CONTROL EQUIPMENT UNDER THE TAX REFORM ACT OF 1976,
Texas Tech. Univ., Lubbock. Dept. of Accounting.
R. W. Ingram.
Taxes - The Tax Magazine, Vol. 55, No. 8, p 511-515, August 1977. 1 tab.

The Federal Tax Reform Act of 1976 (P.L. 93-625) reflects a change in tax policy relative to pollution control equipment. Two provisions will stimulate enviromental protection: (1) reinstatement of the incentive of rapid amortization for equipment in plants in operation before 1976, and (2) permitting use of the investment credit along with rapid amortization, making the incentive more attractive. Most companies will find rapid amortization the more advantageous alternative; only where short-term facilities are involved will depreciation be desirable. Effects of the new policy will be limited by the increase in the minimum tax rate on preference items. Under earlier law, taxpayers could either amortize the amortizable basis of the equipment over a 60-month period, or depreciated the equipment over its useful life than take the investment credit. In many cases, the second option was preferable. The new law amends Section 169 of the old law to include plants in operation prior to January 1, 1976, and extends tax incentives to cover equipment for 'preventing the creation or emission of pollutants.' An additional criterion for rapid amortization qualification specifies that the property shall not significantly 'increase the output or capacity, extend the useful life, or reduce the total operating costs of such plant' not 'alter the nature of the manufacturing...process or facility.' (Lynch-Wisconsin)
W78-04797

PROBLEMS RELATED TO WATER QUALITY AND ALGAL CONTROL IN LOPEZ RESERVOIR, SAN LUIS OBISPO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA.
R. H. Fuller, R. C. Averett, and W. G. Hines.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-243 466, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigation 47-74, February 1975. 46 p, 18 fig, 6 tab, 34 ref. USGS/WRI-47-74.

Descriptors: *Lopez Reservoir(CA), *Eutrophication, *Algal control, *Stratification, *Copper sulfate, Reservoirs, Multiple-purpose reservoirs, California, Water quality control, Dissolved oxygen, Anaerobic conditions, Nutrients, Flood control, Anabaena unispora, Sediments, Organic matter.

A study to determine the present enrichment status of Liopez Reservoir in San Luis Obispo county, California, and to evaluate copper sulfate algal treatment found that stratification in the reservoir regulates nutrient release and that algal control has been ineffective. Nuisance algal blooms, particularly from March to June, have been a problem in the warm multipurpose reservoir since it was initially filled following intense storms in 1968-69. The cyanophyte Anabaena unispora has been dominant; cospecies are the diatoms Stephanodiscus astraea and Cyclotella operculata, and the chlorophytes Pediastrum deplex and Sphaerocystis schroeteri. During an A. unispora bloom in May 1972 the total lake surface cell count was nearly 100,000 cells/ml. Thermal stratification from late spring through autumn results in oxygen deficiency in the hypolimnion and metalimnion caused by bacterial oxidation of organic detritus. The anaerobic conditions favor chemical reduction of organic matter, which constitute 10-14% of the sediment. As algae die, sink to the bottom, and decompose, nutrients are released to the hypolimnion, and with the autumn overturn are spread to the epilimnion. Algal blooms not only hamper recreation, but through depletion of dissolved oxygen in the epilimnion may have caused periodic fishkills. Copper sulfate mixed with sodium citrate and applied at 1.10-1.73 lbs/acre has not significantly reduced algal growth; a method for determining correct dosage is presented. (Lynch-Wisconsin)
W78-04802

WATER SUPPLY AND WATER QUALITY CONTROL STUDY, STONEWALL JACKSON RESERVOIR, WEST FORK RIVER BASIN, WEST VIRGINIA.
Department of Health, Education, and Welfare, Wheeling, WV.; Army Engineer District, Pittsburgh, PA.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 064, Price codes: A05 in paper copy, A01 in microfiche. February 1965. 84 p, 22 tab, 3 fig, 17 ref.

Descriptors: *Stonewall Jackson Reservoir(WV), *West Fork River Basin(WV), *Water supply, *Water quality control, Reservoirs, Streamflow, Water storage, Multiple purpose projects, River basins, Discharge(Water), Acid mine water, Pennsylvania, Pittsburgh(PA), Baseline studies, West Virginia, Monongahela River.

Present and future municipal and industrial water supply needs in the West Fork River Basin of northern West Virginia are analyzed, as well as the degree to which the proposed Stonewall Jackson Reservoir at Brownsville would meet those and other needs. The basin of West Fork River, a tributary of the Monongahela River, covers 881 sq mi. At Brownsville, average annual discharge from 1946-62 was 171 cu ft/sec (cfs). The population of the basin economic study area is about 231,900, expected to reach 336,000 by 2010. Municipal water use by 15 principal communities in the basin is about 15 million gallons/day (mgd). Water quality of the upper reaches of the river generally is good, but downstream of Clarksburg acidic tributaries draining coal-mining areas degrade the quality of the main stem. Regulation of the streamflow by the Stonewall Jackson Reservoir could provide increased assured flows in the West Fork, Monongahela, and Ohio Rivers, and also improve oxygen concentrations, reduce hardness and acidity, and improve other water quality parameters. The Pittsburgh reach of the Monongahela receives the greatest waste load of the entire system, and summer flows as high as 4,000 cfs may be needed by 2010 to assimilate organic waste loads. As the proposed reservoir could provide only 4-17% of this requirement, other projects would be necessary. Storage needs and provision by the reservoir for various cities are discussed. (Lynch-Wisconsin)
W78-04807

WATER SUPPLY AND WATER QUALITY CONTROL STUDY, BUCK CREEK RESERVOIR, MIAMI RIVER BASIN, OHIO,
Public Health Service, Charlottesville, VA. Region III.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 065, Price codes: A04 in paper copy, A01 in microfiche. June 1965. 61 p, 1 fig, 28 tab, 11 ref, 1 append.

Descriptors: *Buck Creek Reservoir(OH), *Water quality control, *Water supply, *Flood control, *Water demand, Reservoirs, Ohio, Baseline studies, Streamflow, Multiple-purpose reservoirs, Recreation, River basins, Miami River(OH), Mad River(OH), Buck Creek(OH), Projections, Planning.

A study was made to furnish data for evaluating the need for the proposed Buck Creek Reservoir in Clark County, east of Springfield, Ohio. While no present or future need (to the year 2020) is seen for municipal or industrial water supply storage, a progressively greater annual need is projected for storage for water quality control purposes. The project is planned by the U.S. Army Corps of Engineers for flood control and associated purposes on Buck Creek, a tributary of the Mad River, which is a major tributary of the Miami River. The study area, with a population of about 1,044,000 in 1960, will have an estimated population of 2,222,000 in 2020, with over 90% urban. By 2020 a summer flow of 1400 cfs will be needed in the Miami River at Dayton to assimilate an estimated residual organic waste load of 269,000 P.E., and streamflow regulation will be necessary. An annual draft-on-storage of 203,000 acre-feet will be needed by 2020 for water quality control below the Dayton sewage treatment plant outfall; about 20,000-40,000 acre-feet could be provided by the Buck Creek Reservoir. The minimum annual value of the benefits for providing the entire draft-on storage would be $1,750,000 of which $172,000-$345,000 would be attributable to the Buck Creek Reservoir, based on a 50-yr project life and a 3-1/8% interest rate. Data from the study are presented in tables. (Lynch-Wisconsin)
W78-04808

A MODELING APPROACH FOR PREDICTING NUTRIENT INFLUENCES ON LAKES AND THEIR WATERSHEDS,
Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.
For primary bibliographic entry see Field 5C.
W78-04814

COMMENT: WATER LAW - CESSATION OF RETURN FLOW AS A MEANS OF COMPLYING WITH POLLUTION CONTROL LAWS,
Wyoming Univ., Laramie. Coll. of Law.
For primary bibliographic entry see Field 6E.
W78-04815

ORGANIC CARBON AND DEOXYGENATION IN THE PAMLICO RIVER ESTUARY,
East Carolina Univ., Greenville, SC. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W78-04816

AN ECONOMIC ANALYSIS OF OPTIMAL INVESTMENT SCHEDULING FOR SALINITY CONTROL IN THE COLORADO RIVER,
California Univ., Berkeley. Dept. of Civil Engineering: California Univ., Berkeley. Graduate School of Management.
D. Erlenkotter, and C. R. Scherer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 328, Price codes: A13 in paper copy, A01 in microfiche. Completion Report, December 1977. (California Water Resources Center Project UCAL-WRC-W-474) 267 p, 92 ref, 2 append. OWRT B-170-CAL(5).

Descriptors: *Salinity, *Colorado River, *Economics, Planning, Mathematical models, *Evaluation, Investment, *Optimal investment scheduling, *Salinity control, *Comprehensive planning, *Model studies, Standards, Water demand, Computer models, Water quality standards, Dynamic programming, Cost analysis.

This study demonstrates the development of a comprehensive investment planning model for salinity control on the Colorado River for evaluation of alternate salinity control plans and determination of those plans that minimize total economic costs and damages. Sources of salinity, early modeling efforts, selected legal-institutional factors and recent salinity control plans are reviewed. The planning model developed includes the relevant detail of deterministic simulation models for the Colorado and incorporates estimates of economic damages and project costs that may be drawn from other mathematical programming models for agricultural areas and salinity control sites. The model serves best as an information system for exploring the effects of cost-minimizing plans of different assumptions and data variations. Instead of relying on arbitrarily established salinity standards, the model determines future salinity levels--or 'standards'--endogenously by balancing costs and benefits of incremental additions to the salinity control plan. Relevance to policy decision-making involves a dynamic programming model that coordinates selection of scale for individual projects and the sequence in which projects are undertaken under assumptions of a linearly increasing demand projection and constant per-unit penalty cost for not satisfying demand. The model also pinpoints the difficulties involved in developing a solution approach under more general assumptions and shows why approximate solution methods may be needed for complex water resources development problems. (Snyder-Calif Davis)
W78-04817

THE DEHELMINTHIZATION OF LIQUIDS BY THE ELECTROHYDRAULIC EFFECT, (IN RUSSIAN),
Vsesoyuznyi Inst. Eksperimentalnoi Veterinaryi, Belgorod (USSR). Belgorod Div.
A. E. Dol'nikov, and K. V. Mel'nikova.
Gig Sanit 10, p 115-116, 1976.

Descriptors: Activated sludge, *Electrohydraulic effect(Ascarid eggs), *Dehelminthzation.

The ovicidal effectiveness of the electrohydraulic effect (EHE) was studied on ascarid eggs in water. The eggs were extracted from females found in pig intestines. The ovicidal effectiveness of the EHE was 90% at 20 discharges, 96% at 40, 99% at 60 and 100% at 70. The addition of even an insignificant amount of activated sludge to the water caused an appreciable reduction in ovicidal effectiveness.--Copyright 1978, Biological Abstracts, Inc.
W78-04825

A REVIEW OF MULCHES TO CONTROL WIND EROSION,
Agricultural Research Service, Manhattan, KS. North Central Region.
For primary bibliographic entry see Field 4D.
W78-04839

CHARACTERIZATION AND TREATMENT OF WASTE DISCHARGED FROM HIGH-DENSITY CATFISH CULTURES,
Tennessee Valley Authority, Chattanooga. Div. of Environmental Planning.
For primary bibliographic entry see Field 5B.
W78-04898

MANAGEMENT OF MAN-MADE EUTROPHICATION: THE SWEDISH CONCEPT,
Association of Swedish Chemical Industries, Stockholm (Sweden).
H. O. Bouveng.
The Journal of the American Oil Chemists' Society, Vol 55, p. 178-180, 1978. 3 fig.

Descriptors: *Eutrophication, *Nutrients, *Nutrient removal, *Biochemical oxygen demand, *Chemical oxygen demand, *Phosphorus compounds, *Plankton, *Sewage treatment, *Waste water(Pollution), Effluents, Economic impact, Economic feasibility, *Sweden, Eutrophication management.

The Swedish approach for the control of man-made eutrophication is described as simple, pragmatic and effective. It was founded on a combination of an agreed definition of the problem, appropriate management instruments, adequate technology, available funds, and participation by concerned parties. (Katz)
W78-04917

THE EFFECT OF PUBLIC LAW 92-500 ON ARIZONA'S WATER FUTURE,
Southwest Forest Industries, Phoenix, AZ.
R. A. Miller.
In: Proceedings of the 20th Annual Arizona Watershed Symposium, Arizona Water Commission, Report No 8, September 15, 1976, p 43-50.

Descriptors: *Water pollution control, *Water pollution, *Water quality, *Arizona, Legislation, Federal Water Pollution Control Act, Forests, Environmental effects, Legal aspects, Federal-state water rights conflicts, Environmental Protection Agency.

Report of a panel discussion concerned with the forest products industry's involvement in the implementation of Public Law 92-500, the Federal Water Pollution Control of Amendments of 1972. The industry will be affected by the legislation due to the potential impact on road building and logging activities. Environmental Protection Agency requirements and their effect on the forest products industry are discussed. Anomalies in Federal Water Pollution control are pointed out. Arizona's surface and groundwater are governed by separate systems of laws concerning the rights to those waters. The role of the state Health Department in the determination of water quality is described. Section 208 of the Act which deals with water quality management, is evaluated. (See also W78-04934) (Jamail-Arizona)
W78-04939

PROCEEDINGS OF CONFERENCE ON ENVIRONMENTAL QUALITY SENSORS (SECOND) HELD AT NATIONAL ENVIRONMENTAL RESEARCH CENTER, LAS VEGAS, NEVADA ON OCTOBER 10-11, 1973.
National Environmental Research Center, Las Vegas, NV.
For primary bibliographic entry see Field 5A.
W78-04947

ANALYSIS OF SOME AQUATIC ENVIRONMENTS OF THE VALLEY OF KATHMANDU DURING THE MONSOON PERIOD: AUGUST-SEPTEMBER, 1971, (IN FRENCH),
Centre Univ. de Savoie, Chambery (France). Lab. de Biologie Vegetale.
A. Maire.
Trav Lab Hydrobiol Piscicult Univ Grenoble 64/65, p99-108, 1974.

Descriptors: *Algae, Aquatic environment, *Coleoptera, *India(Kathmandu Valley), Monsoons, *Odonata, Rice, Potable water, Water quality standards, *Water analysis, Sampling, Pollutant identification.

The physical-chemical analyses conducted on water samples taken from various aquatic environments in the Valley of Kathmandu (India) illustrate the characteristics of the tropical biotpoes during the August-September monsoon period. The muddy rainy season did not permit taking faunistic samples. Only the adults of Odonata and some Coleoptera were captured. The Drinking Water Supply Office, in collaboration with the Organization of United Nations is undertaking the sampling of running waters upstream of the principal basins of the valley, used for supplying drinking water to Kathmandu and Patan, the 2 largest population centers in the valley. The river water is low in mineral salts. NO3, NO2, PO4, SO4 are presumed to be rapidly absorbed by rice paddies and associated plants, especially algae. The biotope of the rice fields is a temporary aquatic environment; the water is stagnant for a time, but moves during the rainy period.--Copyright 1976, Biological Abstracts, Inc.
W78-04962

ANALYSIS OF BRINE DISPOSAL IN THE GULF OF MEXICO. 1. BRYAN MOUND,
National Oceanic and Atmospheric Administration, Washington, DC. Environmental Data Service.
J. M. Bishop.
Report to Federal Energy Administration Strategic Petroleum Reserve Program, Salt Dome Storage, February 1977. 177 p, 90 fig, 8 tab, 25 ref, 5 append.

Descriptors: *Waste disposal, *Brines, *Environmental effects, *Water quality control, *Gulf of Mexico, Texas, Dispersion, Meteorological data, Oceanographic data, Ecology, Bathymetry, *Brine disposal, *Salt dome storage, *Petroleum reserves, Environmental factors, Storage caverns.

In implementing the Strategic Petroleum Reserve (SPR), the Federal Energy Administration (FEA) proposes to use storage caverns leached-out of the Bryan Mound salt dome on the coast of Texas near Freeport. Discharge into the Gulf of Mexico is an alternative under consideration for disposal of the saturated brine now in existing caverns and brine to be produced as additional caverns are solution-mined. This report was prepared to assist FEA in a full examination of potential environmental impacts of this brine disposal alternative as that agency presses to meet the legislative mandate of the SPR Program. An extensive summary of meteorological, oceanographic, and bathymetric conditions in the Bryan Mound Study area is provided based upon existing data and information, and an overview of ecological conditions in the study area has been prepared. (NOAA)
W78-04963

ANALYSIS OF BRINE DISPOSAL IN THE GULF OF MEXICO. 2. WEST HACKBERRY,
National Oceanic and Atmospheric Administration, Washington, DC. Environmental Data Service.
J. M. Bishop.
Report to Federal Energy Administration Strategic Petroleum Reserve Program, Salt Dome Storage, March 1977. 120 p, 62 fig, 12 tab, 37 ref, 4 append.

Descriptors: *Waste disposal, *Brines, *Environmental effects, *Water quality control, Gulf of Mexico, Louisiana, Dispersion, Meteorological data, Oceanographic data, Ecology, Bathymetry, *Brine disposal, *Salt dome storage, *Petroleum reserves, Environmental factors, Storage caverns.

In implementing the Strategic Petroleum Reserve (SPR), the Federal Energy Administration (FEA) proposes to use storage caverns leached-out of the West Hackberry salt dome on the coast of Louisiana near Lake Calcasieu. Discharge into the Gulf of Mexico is an alternative under consideration for disposal of the saturated brine now in existing caverns and brine to be produced as additional caverns are solution-mined. This report was prepared to assist FEA in a full examination of potential environmental impacts of this brine disposal alternative as that agency presses to meet the legislative mandate of the SPR Program. An extensive summary of meteorological, oceanograhic, and bathymetric conditions in the West Hackberry study area is provided based upon existing data and information. An overview of ecological conditions in the study area has also been prepared. (NOAA)
W78-04964

ANALYSIS OF BRINE DISPOSAL IN THE GULF OF MEXICO. 4. BIG HILL.
National Oceanic and Atmospheric Administration, Washington, DC. Environmental Data Service.
Report to Federal Energy Administration Strategic Petroleum Reserve Program, Salt Dome Storage, July 1977. 156 p, 63 fig, 25 tab, 103 ref, 3 append.
Gloria D. Thompson (Ed.).

Descriptors: *Waste disposal, *Brines, *Environmental effects, *Water quality control, Gulf of Mexico, Texas, Dispersion, Meteorological data, Oceanographic data, Ecology, Bathymetry, *Brine disposal, *Salt dome storage, *Petroleum reserves, Environmental factors, Storage caverns.

To implement the Strategic Petroleum Reserve (SPR) Program, the Federal Energy Administration (FEA) proposes to use storage caverns leached out of a salt dome known as Big Hill on the coast of Texas 15 miles west of Sabine Pass. Discharge into the Gulf of Mexico is being considered for disposal of the saturated brine to be produced as a result of creating these solution-mined caverns. This report will assist FEA in fully examining the potential environmental impact of this brine disposal option. It includes: an extensive summary of physiographic, meteorological, oceanographic, and water quality conditions along the Texas coast adjacent to the Big Hill site; a comprehensive review of ecological conditions in the area; analysis of the dispersion of salt brine to be discharged at the two locations offshore, under various environmental conditions; general considerations for a brine diffuser at the Big Hill site; and the potential impact of brine due to osmotic stress. (NOAA)
W78-04965

PROJECT DEVELOPMENT AND TECHNICAL DEVELOPMENT PLAN. NEW YORK BIGHT PROJECT.
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
NOAA, ERL, Marine EcoSystems Analysis Program Office Report, July 1977. 228 p, 6 fig, 7 tab, 124 ref, append. SAI Contract-NOAA-03-7-022-35105.

Descriptors: *Resources development, *Baseline studies, *Environmental effects, *Water pollution sources, *Water pollution effects, New York, Land use, Coasts, Ecosystems, Waste disposal, Oil spills, Sewage, *Outer Continental Shelf, *New York Bight, Coastal Zone management, Ocean dumping.

The Marine EcoSystems Analysis (MESA) Project Development Plan has been jointly prepared by the MESA Program Office and the New York Bight Project Staff and represents the overall plan for project implementation. The plan describes a systematic approach to achieving specifically identified goals and objectives that have been delegated to the Department of Commerce for protection of the marine environment. The overall goals of the Project are to develop a comprehensive understanding of the processes and interrelationships of the ecosystem and to determine the fate and effects of pollutants and other man-related stresses on the New York Bight. More specific goals include planning for future actions such as monitoring of the Bight, oil and gas development, offshore nuclear power generation, and the development of alternatives to existing waste disposal strategies. (NOAA)
W78-04969

INSTITUTIONAL DESIGN FOR IMPROVED ENVIRONMENTAL QUALITY: LEGAL AND ECONOMIC ASPECTS IN WISCONSIN,
Wisconsin Univ.-Madison. Dept. of Agricultural Economics.
D. W. Bromley, M. McMillan, M. Robertson, and A. Schroeder.
Sea Grant College Program Technical Report No 232, October 1977. 256 p, 11 tab, 12 maps.

Descriptors: *Water quality, *Legal aspects, *Jurisdiction, *Water pollution, Wisconsin, Economics, *Environmental assessment, Fox River Basin(WI), Regional environmental quality authority.

This report is concerned with the nature of a regional environmental quality authority (REQA) that might effectively deal with environmental (primarily water) quality problems in the Fox River Basin of northeastern Wisconsin. Several disciplinary points of view are integrated to attempt a thorough assessment of the problems and the prospects. Attention is given to the concepts of

public choice theory with respect to voting rules and jurisdictions, and pluralism and models of representation are discussed. The most carful scrutiny is reserved for the possible legal constraints and opportunities for the establishment of an REQA. An analysis of federal statutes and the Wisconsin Constitution is given with respect to the possible establishment of an REQA in the Lower Fox Basin. Possible jurisdictional boundaries, possible criteria for electing commissioners for the REQA and general issues pertaining to the policy setting and administration of such an authority are suggested. Avenues for implementing an REQA with a maximum of citizen input at the local level are suggested. The emphasis is on ways to minimize the possible conflicts that might arise when inter-jurisdictional action is undertaken to deal with environmental quality matters. (NOAA)
W78-04971

REPORT TO THE CONGRESS ON OCEAN POLLUTION, OVERFISHING, AND OFFSHORE DEVELOPMENT.
National Oceanic and Atmospheric Administration, Washington, DC.
For sale by the Superintendent of Documents, U. S. Gov't Print. Off. Washington, DC 20402. NOAA Report for the period July 1975 through September 1976 (Pulic Law 92-532 Title II, Section 202c), November 1977. 58 p, 2 append.

Descriptors: *Pollution, *Oil pollution, *Coasts, *Estuaries, Resources development, *Overfishing, Ocean mining, Biological effects, Environmental assessment, Ocean dumping, Outer Continental Shelf, Oil leases.

The programs summarized in this report are representative of those conducted by the National Oceanic and Atmospheric Administration Administration, in cooperation with other agencies and organizations, in response to the provisions of the Marine Protection, Research and Sancturaries Act of 1972, Title II, Section 202. This report focuses on six major areas of research: studies of the New York Bight, investigations of the relationships of heavy metals and selected marine organisms, experiments on the effects of petroleum on marine animals, research on the status and effects of overfishing, work on the environmental questions raised by deep-ocean mining, and asessment of the environments of potential offshore oil lease areas. (NOAA)
W78-04972

FRESHWATER AND THE FLORIDA COAST: SOUTHWEST FLORIDA,
State Univ. System of Florida Sea Grant Program, Gainesville; and Southwest Florida Water Management District, Brooksville.
For primary bibliographic entry see Field 2L.
W78-04973

LIMNOLOGIC STUDIES ON THE COLORADO RIVER FROM LEE'S FERRY TO DIAMOND CREEK,
Arizona State Univ., Tempe. Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W78-05003

QUALITY ASSURANCE RESEARCH PLAN FY 1978-82.
Environmental Protection Agency, Washington, DC. Office of Research and Development.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 421, Price codes: A04 in paper copy, A01 in microfiche. Report No. EPA-600/8-77-008, July 1977. 53 p, 1 fig, 12 tab. 1HD621.

Descriptors: *Water pollution, *Air pollution, *Sanitary engineering, Water supply, Water quality, Environmental effects, Environmental engineering, Civil engineering, Quality control, Project planning, Monitoring, Sampling, Quality assurance, Environmental data, Environmental measurements.

The quality assurance research plan for fiscal years 1978 through 1982 identifies and justifies the resources required by EPA's Office of Water Research and Development (ORD), to develop the quality assurance tools, techniques, and services needed by other program offices, the EPA regions, and the States to generate valid data. The program is described in terms of goals, objectives, and functional elements; the current status of ORD's ongoing quality assurance efforts is summarized; Agency and program needs are discussed and the resources and approaches required to develop and carry out a dynamic program which will ensure scientifically valid environmental measurements are delineated: Common quality assurance program needs identified by EPA regional offices were also discussed; they include comprehensive long-term quality assurance plans for the regions, standardization protocols for measurement methods with an approval mechanisms for methods suggested, a system to quantify data quality and to reject data out of control, and quality control and references samples for routine use. (Wares-IPA)
W78-05007

MANUAL: RESEARCH AND DEMONSTRATION OF IMPROVED SURFACE MINING TECHNIQUES FOR THE EASTERN KENTUCKY COAL FIELDS.
Kimball (L. Robert) Consulting Engineer, Lexington, KY.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 578, Price codes: A03 in paper copy, A01 in microfiche. Report No. ARC-71-66-T5, March, 1974. 30 p, 18 fig, 2 tab, 5 append. Prepared for Appalachian Regional Commission, Washington, DC. ARC 71-66.

Descriptors: *Pollutant identification, *Coal mine wastes, *Acid mine water, Evaluation, *Pollution abatement, *Kentucky, *Analytical techniques, Sampling, Water analysis, Water pollution sources, Coal mines, Mine drainage, Pyrite, Water pollution, Mine water, Inspection, *Strata sampling, *Acid pollution potential, Eastern Kentucky.

Since acid production potential varies with coal seam stratum, strata of high pollution potential (as indicated in a recently completed Water Quality Study for the Eastern Kentucky Coal Field) were sampled and analyzed, with the intention of determining plans to minimize this acid production after defining the potential. Indictors and procedures are presented to assist the reclamation inspector in identifying such potential in the particular area in Eastern Kentucky which was proposed for surface mining. Ongoing data analysis geared at pinpointing new areas of high pollution potential and eliminating from testing those coal seams with low pollution potential serve to (1) update and refine evaluation techniques; (2) further the overall goal of determining those mining plans which best minimize acid production; and (3) introduce improved surface mining techniques. The manual provides the inspector with guidelines for controlling acid pollution from permit application through bond release. Appendices A-F include data and figures on coal seam groupings, water quality summary, mineral recognition, laboratory strata testing procedures, selective burial and acid neutralization. (Seip-IPA)
W78-05013

ORDER CLASSIFICATION OF URBAN CATCHMENTS,
North Carolina Univ. at Raleigh. Water Resources Research Center.
For primary bibliographic entry see Field 2E.
W78-05022

ESTIMATING RUNOFF FROM FURROW IRRIGATION,
Kansas State Univ., Garden City. Garden City Experiment Station.
For primary bibliographic entry see Field 3F.
W78-05034

RAPID CITY COMBATS THE EFFECTS OF URBAN RUNOFF ON SURFACE WATER,
Environmental Protection Agency, Pierre, SD.
For primary bibliographic entry see Field 5B.
W78-05044

STUDIES ON THE ROLE OF SOLAR ULTRAVIOLET RADIATION IN 'NATURAL' WATER PURIFICATION BY AQUATIC ECOSYSTEMS,
Kentucky Water Resources Research Inst., Lexington.
J. Calkins, J. A. Barcelo, P. Grigsby, and S. Martin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 666, Price codes: A06 in paper copy, A01 in microfiche. Research Report No. 108, January 1978. 91 p, 26 fig, 7 tab, 29 ref. OWRT A-064-KY(2), 14-34-0001-6018 (FY-76), 14-34-0001-7037 (FY-76T), 14-34-0001-7038 (FY-77).

Descriptors: Ozone, *Ultraviolet radiation, Ecosystems, Attenuation, Microorganisms, *Solar radiation, Algae water purification, Model studies, Photosynthesis, Light intensity, Sensitivity(Organisms to solar UV).

The possibility that pollution might deplete the stratospheric ozone layer and intensify solar UV at the earth's surface focuses attention on the role of solar UV in the various ecosystems at the earth's surface. Previous studies suggested that solar UV might contribute to bacterial die off in wastewater and the studies reported here were directed toward elucidating the action of solar UV in 'natura' waters. It has been assumed that solar UV action on aquatic ecosystems can be evaluated (using proper models) on the basis of the following four independently measurable quantities: (1) the intensity of solar UV at the water surface, (2) the attenuation of the UV in the water column, (3) the position of the critical organism in the water, and (4) the sensitivity of the individual organisms to solar UV exposure. These four factors have been investigated on a continuing basis and the results of measurements have been utilized along with special field and laboratory experiments to assess UV-B actions. Field work has focused on the sucession of organisms, their locations in the water column, and under controlled conditions, the killing of E. coli by natural sunlight. Laboratory work has included studies of UV-B lethality, its ability to stimulate positioning responses, and its depression of the photosynthetic activity of algae. Laboratory and field observations have been interpreted through models and results are consistent with the hypothesis that solar UV is a significant agent for the aquatic microorganisms we have tested. (Huffsey-Kentucky)
W78-05051

NON-POINT WATER QUALITY MODELING IN WILDLAND MANAGEMENT: A STATE-OF-THE-ART ASSESSMENT VOL. II: APPENDIXES.
Forest Service (USDA), Washington, DC.
For primary bibliographic entry see Field 5B.
W78-05055

A STUDY OF THE EFFECTS OF STREAM CHANNELIZATION AND BANK STABILIZATION ON WARMWATER SPORT FISH IN IOWA. SUBPROJECT NO. 2. A STUDY OF THE IMPACT OF SELECTED BANK STABILIZATION STRUCTURES ON GAME FISH AND ASSOCIATED ORGANISMS,
Iowa Cooperative Fishery Research Unit, Ames.

For primary bibliographic entry see Field 6G.
W78-05097

NUTRIENT REMOVAL BY WATER HYACINTHS,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
D. A. Cornwell, J. Zoltek, Jr., C. D. Patrinely, T. deS. Furman, and J. I. Kim.
Journal of Water Pollution Control Federation, Vol 49, No 1, p 57-65, January, 1977. 5 fig, 4 tab, 15 ref.

Descriptors: *Nutrient removal, *Biological treatment, *Water hyacinth, Aquatic plants, Nitrogen, Phosphorus, Sewage treatment, Growth rates, Water pollution control, *Water pollution treatment, Pollution abatement, Nutrient sloughing.

Nutrient removal capacity of water hyacinths was directly related to pond surface area. Pond depth and detention time in the pond must be set so as to provide a given amount of surface area per unit flow through the system. To remove 80% of the nitrogen, 2.1 ha of water hyacinths were needed per 3800 cu m water/da. Corresponding phosphorus removal was approximately 44%. Nutrients sloughed during the death phase phosphorus removal was approximately 44%. Nutrients sloughed during the death phase remained in the ponds as bottom sediment, reducing the necessity for harvesting. When harvested, the most profitable use of water hyacinths would be as compost. (Stihler-Mass)
W78-05104

FEASIBILITY OF UTILIZATION OF WETLAND ECOSYSTEMS FOR NUTRIENT REMOVAL FROM SECONDARY MUNICIPAL WASTEWATER TREATMENT PLANT EFFLUENT,
Michigan Univ., Ann Arbor.
R. H. Kadlec, D. L. Tilton, and J. A. Kadlec.
Semi-annual report No 5, 1977. 364 p.

Descriptors: *Biological treatment, *Tertiary treatment, *Nutrient uptake, *Aquatic plants, Wetland, *Michigan, Waste water treatment, Nitrogen, Phosphorus, Cattails, Element budgets, Sedges, *Houghton Lake(Mich), Peatland.

The feasibility of wetland tertiary treatment of sewage plant effluent has been established via field experimentation on a peatland location at Houghton Lake, Michigan. Many 36 sq m test plots and one 40,000 sq m test plot were used. Water movement is sheet flow at a very slow velocity. Algal nutrient uptake is potentially significant. Bioassay algal growth rates increased from 85 mg dry wt/sq m day (-1) at the control site to 2656 mg dry wt/sq m day (-1) at the site of effluent addition. Phosphorus concentrations were significantly higher in algae grown at the discharge site. Cattail dimensions ant the chlorophyll a content of Carex sp. leaves were highest near the discharge site. Biomass components showed increased P and K concentrations in sedge shoots and roots as well as in letter. N concentrations showed no significant difference among locations. Soils showed an increase in P near the discharge site. Waste water scheduling into the marsh is determined from simulation and optimization. Because nutrient uptake is quite efficient, water depth is the active constraint. (Stihler-Mass)
W78-05105

GRANULATION OF COMPLEX FERTILIZERS CONTAINING AMMONIUM SULFATE BY MELT TECHNOLOGY,
Ferguson Industries, Dallas, TX.
J. Lanier, and R. MacDonald.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 480, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-600/2-76-295, Environmental Protection Agency, Athens, Georgia Environmental Research Laboratory, December 1976. 94 p, 14 fig, 24 tab, 33 ref, 1 append. 13020 HMV, 68-01-0754.

Descriptors: *Fertilizers, *Granulation, *Melt technology, *Ammonium sulfate, *Pollution abatement, Waste disposal, Industrial wastes, Ammonium compounds, Water pollution sources, Recycling, Water pollution control, Aquifers, Air pollution, Costs.

A modification of the melt granulation process was developed for production of high-nutrient N-P-K-S fertilizer utilizing by-product ammonium sulfate generated by steel and plastic industries and projected power plant ammonia scrubbers. Waste ammonium compounds and sulfur dioxide are common pollutants of aquifers and the atmosphere. A commercial outlet was needed for ammonium sulfate to enable power companies to recover the cost of ammonia used in sulfur dioxide removal from stack gases through scrubbing. In the new process, phosphoric acid and anhydrous ammonia are reacted to form the liquid bonding agent. Solid ammonium sulfate, potassium chloride, and recycled fines are added to the melt in a pug mill. Pollutant emissions are less than from conventional plants and are readily contained. Developed and tested on a laboratory scale and in a small pilot plant, the process was verified in a 454 kg/hr demonstration unit. Operating costs reflect the assumed value of waste ammonium sulfate; cost savings of 10-20% over similar products can be realized. Most conventional fertilizer granulation plants were closed in the 1960s with the advent of granular disammonium phosphate, granular potash, bulk blending marketing stations, and polyphosphate liquids. As a result, the price of by-product ammonium sulfate dropped drastically. (Lynch-Wisconsin)
W78-05118

MOSQUITO PRODUCTION AND CONTROL IN ANIMAL WASTE LAGOONS,
North Carolina State Univ. at Raleigh. Dept. of Entomology.
For primary bibliographic entry see Field 5C.
W78-05123

ECONOMIC AND ENVIRONMENTAL ASPECTS OF DAILY AND ANNUAL MANURE SPREADING SYSTEMS IN SMALL WATERSHED,
Pennsylvania Cooperative Extension Service, Leesport. Agricultural Center.
H. W. Schaffer, G. L. Casler, and J. J. Jacobs.
In: Managing Livestock Wastes, ASAE Publication PROC-275, Proceedings of the 3rd International Symposium on Livestock Wastes held at the University of Illinois, Urbana-Champaign, April 21-24, 1975. p 53-56, 6 tab, 3 ref.

Descriptors: *Manure spreading, *Dairy industry, *Crop production, *Environmental effects, *Nutrients, *Agricultural runoff, *Economic feasibility, Watersheds(Basins), Nonpoint pollution, Fertilization, Agriculture, Farm management, Water pollution control, Nitrogen, Phosphorus, Soil erosion, Model studies, Economics, New York, Canadarago Lake Watershed(NY).

An economic model which simulates nitrogen, phosphorus, and soil losses from two manure spreading Systems shows that changing from a daily to an annual system with immediate soil incorporation reduces phosphorus and soil losses, while also decreasing farm income, but increases nitrogen losses. Requiring farmers to invest in large manure storage facilities therfore appears questionable. Reduced phosphorus loss appears particularly difficult and costly to achieve. Stronger restrictions on nitrogen and phosphorus losses decrease farm income, crop acreage, and livestock populations. Restrictions on either phosphorus or nitrogen are accompanied by reduced losses of the other and by reduced soil losses, indicating interdependencies. The model was constructed from published laboratory and field data; the economic and environmental analysis was made on the 6900-acre Mink Creek basin of the Canadarago Lake watershed in east-central New York. Tables present nutrient and soil losses on various soils for corn silage, potatoes, corn grain, oats, and alfalfa; effects of nitrogen and phosphorus loss restrictions on farm organization and income; and environmental impact scores for odor, flies, appearance, noise, nutrient loss, and risk to water quality, along with cost per cow per year. While the overall environmental impact score for annual spreading with direct soil incorporation (145) is lower than daily spreading (179), several notable tradeoffs occur. (Lynch-Wisconsin)
W78-05129

ECONOMICS OF ALTERNATIVE BEEF WASTE MANAGEMENT SYSTEMS,
Nebraska Univ., Lincoln. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6C.
W78-05130

SYMPOSIUM ON WATER RESOURCES MANAGEMENT IN A CHANGING WORLD, INTRODUCTION: WORLD TRENDS AND NEED,
Colorado Univ., Boulder. Inst. of Behavioral Science.
For primary bibliographic entry see Field 6E.
W78-05133

REPOPULATION AFTER A FISH KILL IN MUD CREEK, WASHINGTON COUNTY, ARKANSAS FOLLOWING PESTICIDE POLLUTION,
Duke Power Co., Huntersville, NC. Environment Lab.
L. L. Olmsted, and D. G. Cloutman.
Trans Am Fish Soc. 103(1), p 79-87, 1974.

Descriptors: *Arkansas, Cattle, Fishkills, Mud Creek(Ark), Pesticide residues, Poison, Ticks, *Fish repopulation, Water pollution control.

Repopulation after a fish kill caused by pesticide pollution in Mud Creek, Washington County, Arkansas is reported. Twenty-nine species of fishes were eliminated from the study area as a result of the poison used in ridding cattle of ticks. Repopulation began almost immediately after the pesticide dissipated, and was accomplished primarily by immature individuals. Chronology and rate of repopulation of each species are reported and factors influencing the rate of repopulation and population structure are discussed.--Copyright 1974, Biological Abstracts, Inc.
W78-05166

DECHLORINATION OF WATER FOR FISH CULTURE: COMPARISON OF THE ACTIVATED CARBON, SULFITE REDUCTION, AND PHOTOCHEMICAL METHODS,
Wisconsin Univ.-Milwaukee. Center for Great Lakes Studies.
G. L. Seegert, and A. S. Brooks.
Journal of the Fisheries Research Board of Canada, Vol. 35, p 88-92, 1978. 1 fig, 1 tab, 18 ref.

Descriptors: *Chlorination, *Carbon, *Carbon filters, *Ultraviolet radiation, *Sodium compounds, *Toxicity, Laboratory equipment, *Reduction(Chemical), Water quality, Pumps, Methodology, Aquiculture, Fish farming, *Dechlorination, Sodium sulfate, Activated carbon, Residual chlorine.

Activated carbon, ultraviolet radiation, and sodium sulfite were evaluated as dechlorinating agents. Activated carbon tested in a variety of commercial dechlorinators was not 100% effective in chlorine removal. The residual concentration

remaining after carbon dechlorination varied from 5 to 70 micrograms/l depending on how long the carbon had been in service and on the flow rate through the carbon bed. Ultraviolet radiation effectively removed residual chlorine from water but compared with the other two methods was considerably more expensive. Sodium sulfite was 100% effective but required a failsafe injection system. A system combining the reliability of carbon dechlorination with the effectiveness of sulfite reduction was developed and shown to be safe, effective, and reliable. (Deal)
W78-05167

BIOMONITORING WITH FISH: AN AID TO INDUSTRIAL EFFLUENT AND SURFACE WATER QUALITY CONTROL,
National Inst. for Water Research Pretoria (South Africa).
For primary bibliographic entry see Field 5A.
W78-05171

AQUATIC TOXICOLOGY: A NEW ELEMENT IN THE SAFETY TESTING OF SURFACTANTS,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5C.
W78-05177

DRINKING WATER AND HUMAN HEALTH,
National Water Well Association, Worthington, OH.
For primary bibliographic entry see Field 5A.
W78-05195

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

EVENT-BASED FORMULATION OF WATERSHED MANAGEMENT,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 4D.
W78-04712

SYSTEMS FOR RAPID RANKING OF ENVIRONMENTAL POLLUTANTS,
Stanford Research Inst., Menlo Park, CA.
For primary bibliographic entry see Field 5A.
W78-04806

MULTIOBJECTIVE WATER RESOURCE PLANNING,
Massachusetts Inst. of Tech., Cambridge.
D. C. Major.
Water Resources Monograph 4, American Geophysical Union, Washington, D.C., 1977. 81 p, 7 tab, 21 fig, 80 ref. OWRT C-2129(No. 3367)(4).

Descriptors: *Water resources development, *Multiobjective planning, *Political decision process, *Investment criteria, Benefit-cost accounting, Net benefits, Alternative costs, Interest rates, Budgetary restrictions, Risks, Pricing, Cost-sharing, Water policy, Irrigation demand, Optimization, Benefit maximization, Design, Projects, Constraints, Weights, Scheduling, Social preferences, Regional income, Environmental quality.

Multiobjective analysis is a generalization of traditional benefit-cost analysis, emphasizing the design of projects and programs in terms of all relevant objectives. Objectives for which water resources development schemes are taken range across the entire spectrum of social decision making: regional development, social-well being, national defense, international trade, national economic development, and environmental improvement. Chapter 1 of this monograph describes the background and development of multiobjective analysis. In chapter 2 the political decision process appropriate to multiobjective planning is presented. Considered are net benefits, social preferences, weights and constraints, the design and display of objectives, and the four steps of planning suggested by Maass et al. Chapter 3 presents rules for multiobjective benefit-cost accounting together with other investment criteria expressed in multiobjective terms. Considered here are: national income, irrigation water demand and benefit maximization, regional income, environmental quality, social objectives, alternative costs, interest rates, scheduling, budget constraints, risk and uncertainty, and pricing and cost sharing. In chapter 4, an introduction to multiobjective planning in practice is given, guidelines for key steps in applied multiobjective planning are presented, and four case studies are described. These include: NAR Water Resources Study; Rio Colorado, Argentina, Study; Big Walnut Study; and Managua Irrigation Scheme. (Bell-Cornell)
W78-04811

APPLICATION OF RESIDUALS MANAGEMENT FOR ASSESSING THE IMPACTS OF ALTERNATIVE COAL-DEVELOPMENT PLANS ON REGIONAL WATER RESOURCES,
Geological Survey, Reston, VA. Water Resources Div.; and Geological Survey, Lakewood, CO. Water Resources Div.
I. C. James, II, and T. D. Steele.
Paper presented at the Third International Symposium in Hydrology, Colorado State University, Fort Collins, Colorado, June 27-29, 1977. 23 p, 2 fig, 21 ref.

Descriptors: *Model studies, *Regional analysis, *Environmental effects, *Coal mines, *Water resources, Planning, Decision making, Water demand, Water supply, *Residuals management, Impact assessment, Energy development, River quality assessment.

The development of coal resources in a region has a variety of effects on available water resources. Direct effects from coal mining, processing, and transport and conversion techniques utilized in or proposed for the region. Indirect effects are related to the growth of population, public services, and commercial activities in the region. Both types of effects impact upon regional water resources in terms of quantity (water withdrawal and consumptive use) and quality, including the capacity to assimilate discharged residuals. Assessment of material and energy balances of the activities causing direct effects, coupled with an economic and technical evaluation of alternatives methods of residuals modification, will provide the primary input data for regional environmental models. An analysis of residuals resulting from activities causing indirect effects will provide additional data for these models. Techniques of regional-residuals management, including modeling the release and movement of residuals in the environment, are used to determine the potential effects of alternative levels of coal development and environmental standards in the Yampa River basin, Colorado and Wyoming. The results provide regional planners with a summary of the potential effects of coal development on the environment and economy upon which they can base decisions concerning the type and extent of development that is desirable. (Woodard-USGS)
W78-04879

6B. Evaluation Process

DECISION STRUCTURE FOR ASSESSMENT OF THE ECONOMIC IMPACT OF WATER QUALITY STRATEGIES IN AN INDUSTRIAL WATERSHED,
Wisconsin Univ.-Madison Dept. of Real Estate and Urban Land Economics.
For primary bibliographic entry see Field 5G.
W78-04701

ACHIEVING URBAN WATER CONSERVATION--A HANDBOOK,
Colorado Univ., Boulder. Dept. of Civil, Environmental and Architectural Engineering.
For primary bibliographic entry see Field 3D.
W78-04702

ACHIEVING URBAN WATER CONSERVATION: TESTING COMMUNITY ACCEPTANCE,
Colorado State Univ., Fort Collins. Dept. of Political Science.
For primary bibliographic entry see Field 3D.
W78-04703

IMPACT OF SOCIAL ATTITUDES ON MANAGING THE ENVIRONMENT,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W78-04724

A PRIORITY-TRADEOFF-SCANNING APPROACH TO EVALUATION IN ENVIRONMENTAL MANAGEMENT,
California Univ., Los Angeles.
C. A. Davos.
Journal of Environmental Management, Vol. 5, No. 3, p 259-273, 1977. 4 tab, 16 ref. B-57027.

Descriptors: *Environmental management, *Evaluation, *Decision-making, *Analytical techniques, *Priorities, Scanning, Planning, Goals, Competing uses, Consensus, Tradeoffs, Problem ranking.

A priority-tradeoff-scanning (PTS) approach is proposed to help satisfy three objectives in environmental management evaluation: (1) to record the impact of each option on all goals and interest groups; (2) to scan all feasible goal-priority tradeoffs for each interest group; (3) to scan priority tradeoffs that are actually acceptible to those groups. On the decision-making evaluation level, the objectives of the PTS approach are: (1) to identify decision choices which will maximize consensus on goal priorities; (2) to identify choices which will maximize the satisfaction of individual interests of competing groups; and (3) to scan priority tradeoffs for maximizing achievement of goals, satisfying the aspirations of planners, and maximizing consensus. This paper is an approach to evaluation, rather than an evaluation methodology, in providing a framework for interpreting and synthesizing all information inputs pertinent to evaluation, instead of generating particular information inputs. The paper also focuses on evaluation of options, not actions. In PTS, pertinent information for each of the three evaluation objectives is synthesized in the form of a matrix; (1) goals-achievement matrix (GAM); (2) goal-priority-tradeoff matrix (GPTM); and (3) interest-priority-tradeoff matrix (IPTM). Each of these matrices is discussed and explained. (Lynch-Wisconsin)
W78-04795

OPPORTUNITIES FOR LARGE SAVINGS BY ALTERING SOME INLAND WATERWAY OPERATIONS.
Comptroller General of the United States, Washington, DC.
Report CED-78-12, to the Congress, December 12, 1977. 42 p, 6 append.

Descriptors: *Bridges, *Locks, *Dismal Swamp Canal(NC), *Inland waterways, *Canals, *Costs, North Carolina, Economic efficiency, U.S. Army Corps of Engineers, U.S. Coast Guard, Navigation, Navigable waters, Atlantic Intracoastal Waterway.

Because of low traffic at predictable times each day, it is recommended that operating hours of many drawbridges and locks on the nation's inland waterways be curtailed, resulting in savings of millions of dollars. The drawbridges and locks identified are currently operated 24 hours a day, seven days a week, under regulations of the U.S. Coast Guard, which by law must provide for the reasonable needs of navigation. Due to availability of land transportation, such round-the-clock is no longer necessary. Twenty-nine drawbridges and locks are specified, on which commercial and recreational traffic is very low between six p.m. and six a.m. There are ten in Florida, eight in North Carolina, four in Virginia, five in the U.S. Army Corps' Wilmington District, and two in the Norfolk District. In addition, Maintenance by the Corps of the Dismal Swamp Canal, an alternate route along the Atlantic Intracoastal Waterway in North Carolina, is no longer justified as no commerical tonnage is transported on the canal. Annual operating expenses for the canal are currently about $435,000. Closing the canal to traffic could also save the Corps and the state of North Carolina $27.4 million on a proposed bridge project; with the canal in operation two high-level bridges would be necessary, whereas with the canal closed low-level fixed-span bridges could be constructed. The reaction of the U.S. Coast Guard to these recommendations was negative. (Lynch-Wisconsin)
W78-04799

MANAGEMENT EVALUATION OF STOCKED NORTHERN PIKE IN COLORADO'S SMALL PLAINS RESERVOIRS,
Colorado State Univ., Fort Collins. Dept. of Fishery and Wildlife Biology.
J. H. Clark.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 363, Price codes: A05 in paper copy, A01 in microfiche. August 1975. 66 p, 17 tab, 23 ref, 6 append. 1-100-R, NOAA 6-11-D, 1-100-R.

Descriptors: *Colorado, *Northern pike, *Fish stocking, *Reservoirs, *Fish management, *Project benefits, *Evaluation, Pikes, Esox lucius, Fish, Fishing, Recreation, Fish establishment, Rough fish, Pan fish, Fisheries, Lakes, Fort Collins(CO).

Fingerling and yarling northern pike (Esox lucius) were stocked in eleven small privately owned reservoirs near Fort Collins, Colorado in an effort to improve existing fishing both by introduction of the new species and by exerting predation on rough fish and stunted panfish. Follow-up evaluation showed that neither size proved successful from a management standpoint. In 16 of 18 introductions of the 50-mm fingerlings the pike did not establish in sufficient numbers to be of interest to fisherman, while the unit cost of the surviving 377-mm yearlings was excessively high ($4.62). For the fingerlings, 50% of the introductions resulted in no observable northern pike populations, 39% resulted in unacceptably small populations (0.8% survival at a cost per surviving fish of $5.90), and only 11% produced acceptable densities, at a cost per surviving fish of $0.14. Survival of the fingerlings depended on availability of large numbers of small forage fish. The fingerlings were stocked at a rate of 62 fish/ha in all of the reservoirs in June 1973, and in seven reservoirs in May 1974. Obtained from research ponds in Colorado, they cost $0.03 each to produce. Yearling pike captured in Minnesota's Red Lake region and purchased at a cost of $1.41 each were stocked in four reservoirs during the winter of 1973-74 at a rate of 25 fish/ha. Seine sampling was conducted several weeks after stocking to estimate total fish populations, and during April-May 1975 northern pike were sampled with gill nets. (Lynch-Wisconsin)
W78-04803

WATER MANAGEMENT REGIONAL PROGRAMS: MORE POTENTIAL THAN SUCCESS,
Delta Coll, University Center, MI. Dept. of Social Science.
B. F. Smith, and W. N. Thompson.
Water and Sewage Works, Vol 125, No 5, p 86-90, May, 1977. 6 tab, 7 ref.

Descriptors: *Michigan, *Watershed management, *Water management(Applied), Regions, *Regional analysis, *Regionalism, Voluntary organizations, Grand River Watershed Council(MI), *Effectiveness perception, *Perception of local impact, *Organizational success, Intergovernmental organizations.

Members of a voluntary Michigan watershed council were interviewed to determine attitudinal and behavioral factors which contribute to the success of a voluntary Regional Water Management organization. The interviews were conducted among 29 members of the Grand River Watershed Council, created in 1966 to coordinate water management problems among local government units. However the council has almost no direct authority to deal with pollution abatement within the jurisdiction of local government units. Oral and written interviews were conducted with the 29 council members, with responses scored and tabulated. The survey covered perceptions of effectiveness awareness, and local impact. Also measured was the relationship between council service and perceptions, and the relation between occupation, area residency and length of residency. Analysis of the data suggests the council's best interests are served by naming as council members individuals of local prestige who can be induced to remain on the council for an extended period. Positive perceptions of the council's effectiveness is related to length of service on the council. Also suggested is that public servants and professionals be named to the council because of their direct stake in the success of an organization of which they are a part. (Coyle-Wisconsin)
W78-04804

PLANNING FOR WATER RESOURCES,
Thames Water Authority, London (England). Corporate Planning.
D. Perret.
Long Range Planning, Vol. 10, No. 2, p 65-72, April 1977. 8 fig, 1 tab, 7 ref.

Descriptors: *Planning, *Thames Water Authority(Great Britain), *Water management(Applied), *Water allocation(Policy), Regional development, Administrative agencies, Water policy, Economics, Economic justification, Economic feasibility, Agriculture, Fisheries.

The Thames Water Authority is one of the ten regional water authorities created in April, 1974 in England and Wales by the 1973 Water Act. The Thames Water Authority consists of a chairman and 57 members, of whom 36 are nominated by local authorities, 17 are appointed by the Secretary of State for the Environment and four are appointed by the Minister of Agriculture, Fisheries and Food. The chief executive and directors implement the Authority's policies through the management structure which consists of nine operating divisions. Each of the nine operating divisions is under supervision of either the director or the assistant director. Operating divisions deal with the following: (1) design of strategies to meet the long term objectives of the authority; (2) assessment of proposals from different parts of the authority; (3) economic studies related to water resources planning; (4) maintenance of the management information system; (5) evaluation of the future options for water resources. The organizational characteristics of the authority are such that it is able to deal with all problem aspects of water resources in the region. (Harris-Wisconsin)
W78-04805

AN ECONOMIC ANALYSIS OF OPTIMAL INVESTMENT SCHEDULING FOR SALINITY CONTROL IN THE COLORADO RIVER,
California Univ., Berkeley. Dept. of Civil Engineering: California Univ., Berkeley. Graduate School of Management.
For primary bibliographic entry see Field 5G.
W78-04817

FLOOD PLAIN DWELLERS' PERCEPTION OF FLOOD HAZARD,
Alberta Univ., Edmonton. Dept. of Geography.
For primary bibliographic entry see Field 6F.
W78-04933

PROCEEDINGS OF THE 20TH ANNUAL ARIZONA WATERSHED SYMPOSIUM,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 4D.
W78-04934

ARIZONA STATE WATER PLAN--PHASE II,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 6E.
W78-04935

PRIVATE AND COMMERCIAL TRIPS IN THE GRAND CANYON. RIVER CONTACT STUDY, PART IV.
Human Ecology Research Services, Inc., Boulder, CO.
B. Shelby, and J. M. Nielsen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 729, Price codes: A04 in paper copy, A01 in microfiche. National Park Service, Grand Canyon National Park Report Series, Colorado River Research Program, Technical Report No. 4, June 1976. 46 p, 23 tab, 20 ref.

Descriptors: *Recreation, Psychological aspects, Wild rivers, Cruises, Campsites, Economics, Recreation facilities, Beaches, Tourism, Transportation, Water management(Administrative), *Boating, *Colorado River, *Arizona, *National Parks, *Grand Canyon National Park.

To preserve the quality of the river experience, many resource managers have instituted use restrictions. These limits have produced controversy over the proportions of total use allocations. The history of the private-commercial controversy is discussed and arguments summarized. Private and commercial users differ on a number of background variables, and trips differ in structural characteristics. Private users tend to be younger and with earlier first wilderness experience, are more likely to belong to outdoor organizations, and report slightly lower incomes. Private trips are usually longer, have more stops at attraction sites, and tend to be oar-powered. The attitudes and perceptions of private users are different from those of commercial users as a whole, but are similar to those of commercial oar passengers. Implications for management are discussed. (Payton-Arizona)
W78-05058

AN OVERVIEW OF THE EFFECT OF LAKE POWELL ON COLORADO RIVER BASIN WATER SUPPLY AND ENVIRONMENT,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
For primary bibliographic entry see Field 4A.
W78-05131

MANAGEMENT OF SCIENTIFIC COLLABORATION IN THE LAKE POWELL RESEARCH PROJECT,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
For primary bibliographic entry see Field 4A.
W78-05132

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ECONOMICS OF ALTERNATIVE BEEF WASTE MANAGEMENT SYSTEMS,
Nebraska Univ., Lincoln. Dept. of Agricultural Economics.
M. Baker.
In: Managing Livestock Wastes, ASAE Publication PROC-275, Proceedings of the 3rd International Symposium on Livestock Wastes held at the University of Illinois, Urbana-Champaign, April 21-24, 1975. p 37-40, 2 fig, 6 tab.

Descriptors: *Feed lots, *Alternative costs, *Manure, *Waste disposal, Economics, Cattle, Farm management, Farm wastes, Waste management, Livestock, Agricultural runoff, Costs, Solid wastes, Investment, Sewage ponds, Sewage disposal.

Analysis of costs of waste management systems for the beef industry show that investments of $4,000 for drylot systems and $50,000 for housed facilities are not uncommon. Annual per-head capacity costs of waste management systems decline as the size of the feeding operation increases, in part because large lots are more likely to be used year-round. Two open drylot waste systems were evaluated: (1) a continuous flow system, and (2) a terraced syste. The major difference is in where settleable solids are stopped and how liquids are transported to detention ponds. Per-head investment costs for the two systems were comparable, ranging from $9.75-$4.60 for lots of 350-7500 head. Annual costs were also similar, ranging from $1.79-$1.10 per head for 350-7500 head lots. Four housed-facility systems were assessed: (1) oxidation ditch system, (2) deep pit system, (3) shallow pit system, and (4) slot flush system. For 500 and 100-0667 head lots, the respective per head investment costs were: (1) $88-78, (2) $110-89, (3) $87-68, and (4) $56-41. Depreciation, interest on investment, insurance, taxes, and operating costs were included in the annual cost figures. A description of the operation of all six systems is given, as well as a further breakdown of costs. (Lynch-Wisconsin)
W78-05130

6D. Water Demand

ACHIEVING URBAN WATER CONSERVATION--A HANDBOOK,
Colorado Univ., Boulder. Dept. of Civil, Environmental and Architectural Engineering.
For primary bibliographic entry see Field 3D.
W78-04702

ACHIEVING URBAN WATER CONSERVATION: TESTING COMMUNITY ACCEPTANCE,
Colorado State Univ., Fort Collins. Dept. of Political Science.
For primary bibliographic entry see Field 3D.
W78-04703

WATER SUPPLY AND WATER QUALITY CONTROL STUDY, STONEWALL JACKSON RESERVOIR, WEST FORK RIVER BASIN, WEST VIRGINIA.
Department of Health, Education, and Welfare, Wheeling, WV.; Army Engineer District, Pittsburgh, PA.
For primary bibliographic entry see Field 5G.
W78-04807

WATER SUPPLY AND WATER QUALITY CONTROL STUDY, BUCK CREEK RESERVOIR, MIAMI RIVER BASIN, OHIO,
Public Health Service, Charlottesville, VA. Region III.
For primary bibliographic entry see Field 5G.
W78-04808

AN ECONOMIC ANALYSIS OF OPTIMAL INVESTMENT SCHEDULING FOR SALINITY CONTROL IN THE COLORADO RIVER,
California Univ., Berkeley. Dept. of Civil Engineering: California Univ., Berkeley. Graduate School of Management.
For primary bibliographic entry see Field 5G.
W78-04817

GROUND-WATER RESOURCES OF COLQUITT COUNTY, GEORGIA,
Geological Survey, Doraville, GA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04875

WATER SUPPLY DILEMMAS OF GEOTHERMAL DEVELOPMENT IN THE IMPERIAL VALLEY OF CALIFORNIA,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 4B.
W78-05028

6E. Water Law and Institutions

THE CHALLENGE TO AMERICAN AGRICULTURE OF P.L. 92-500 FROM A NATIONAL VIEWPOINT - FOCUS ON 'POLITICAL RULINGS AS THEY AFFECT NPS PROGRAMS',
Environmental Protection Agency, Washington, DC. Water Planning Div.
For primary bibliographic entry see Field 5G.
W78-04720

TAX PLANNING FOR POLLUTION CONTROL EQUIPMENT UNDER THE TAX REFORM ACT OF 1976,
Texas Tech. Univ., Lubbock. Dept. of Accounting.
For primary bibliographic entry see Field 5G.
W78-04797

PLANNING FOR WATER RESOURCES,
Thames Water Authority, London (England). Corporate Planning.
For primary bibliographic entry see Field 6B.
W78-04805

COMMENT: WATER LAW - CESSATION OF RETURN FLOW AS A MEANS OF COMPLYING WITH POLLUTION CONTROL LAWS,
Wyoming Univ., Laramie. Coll. of Law.
R. G. Berger.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 324, Price codes: A03 in paper copy, A01 in microfiche. Land and Water Law Review, Vol 12, No 2, p 431-456 (1977). OWRT A-023-WYO(1). 14-34-0001-7108.

Descriptors: *Water law, *Water pollution control, *Return flow, Social aspects, Legal aspects, Economic impact, Water quality control, Total containment control system, Cessation of return flow.

Social, legal, and economic policies in regard to the creation and continuation of the total containment water quality control system are examined. Discussed are whether the intentional disposal of water by evaporation incident to industrial or municipal uses is a beneficial use for which water may be appropriated and the means and policies available for determination of whether a beneficial use exists. Assuming disposition of polluted water by the total containment system is a reasonable beneficial use, the author discusses the relative rights of the junior appropriator and the no-discharge user when both depend directly or indirectly on return flow to satisfy their appropriations. Finally, an economic analysis of the total containment system is made. Arguments for and against allowing the total containment process as a means of meeting water quality control requirements are discussed. It is concluded that the legal and economic structure suggests the total containment rights should be denied. The denial is based on the principal that the costs of a total containment system should be absorbed by the pollutor and consumer who benefit from operations causing pollution. In the total containment system the social and economic costs can be internalized only if the water user is denied the right to cease return flow in lieu of treating and discharging the polluted effluent.
W78-04815

ARIZONA STATE WATER PLAN--PHASE II,
Arizona Water Commission, Phoenix.
W. E. Steiner.
In: Proceedings of the 20th Annual Arizona Watershed Symposium, Arizona Water Commission, Report. No 8, September 15, 1976, p 6-10, 1 fig.

Descriptors: *Arizona, *Water resources, *Water resources development, *Federal-State Water Right Conflicts, *Water resources planning, Water Allocation(Policy), Planning, Federal project policy, Water policy, Water requirements, Competing uses, Water utilization, Future planning(Projected), State governments, *Central Arizona Project.

This serves as a partial progress report on water resource activities in Arizona during recent years. The Central Arizona Project and Indian water rights are discussed. In the early 1970's the author called for a much more comprehensive and agressive water resources development planning program. He felt and still feels that if Arizona is to chart her own destiny, she must perform enough of the basic water planning to be able to articulate her desires concerning development and break the historic mold of virtually complete reliance on the Federal planning, but not without sufficient state and local planning. Phase I of the proposed state water plan provides for an inventory of the state's water resurces and current uses, Phase II will look at the water options available to the state of Arizona. (See also W78-04934) (Jamail-Arizona)
W78-04935

FOREST SERVICE'S ROLE IN ARIZONA'S WATER FUTURE,
Forest Service, Albuquerque, NM.
M. J. Hassell.
In: Proceedings of the 20th Annual Arizona Watershed Symposium, Arizona Water Commission, Report No 8, September 15, 1976, p 40-42.

Descriptors: *Arizona, *Watershed management, *Watersheds(Basins), *Forest watersheds, *Water pollution control, Pollution abatement, Forests, Water quality, Water demand, Southwest US, Water resources, Environmental effects, Water conservation, Water supply, Planning, US Forest Service.

The Forest Service plays a vital role in watershed management in Arizona. That role is briefly described. The provisions of the Federal Water Pollution Control Act of 1972, Public Law-92-500, that are concerned with the Forest Service are discussed. The most important sections of the bill are those concerned with nonpoint source pollution abatement planning by the states and a dredge and fill permit program administered by the Corps of Engineers. A positive spin-off from this law is the arrangement that requires Federal, state and local agencies and citizen groups such as the Arizona Water Resources Committee to work

together toward a common objective. Some examples of Forest Service work in watershed management over the past twenty years is reported. (See also W78-04934) (Jamail-Arizona)
W78-04938

THE EFFECT OF PUBLIC LAW 92-500 ON ARIZONA'S WATER FUTURE,
Southwest Forest Industries, Phoenix, AZ.
For primary bibliographic entry see Field 5G.
W78-04939

THE CAP IN CONTROVERSY,
Central Arizona Project Association, Phoenix.
R. Johnson.
In: 20th Annual Arizona Watershed Symposium, Arizona Water Commission, Report No 8, September 15, 1976, p 59-60.

Descriptors: *Water supply, *Colorado River, *Arizona, *Federal project policy, *Water resources, *Water resources development, Competing uses, Irrigation, *Central Arizona Project, Indian water rights, Tucson, Phoenix.

The Central Arizona Project has been the subject of controversy for over 30 years. The opposition positions to the CAP are outlined and discussed. One of these is that the Colorado River is bankrupt; that there is no water available for the CAP. It is pointed out that while this may be true on paper, there is actually a surplus of water. Another opposition claim is that central Arizona urban municipalities have no need for CAP water either now or in the future. However, Tucson is likely to require additional water supplies in the near future. Indian water claims are discussed. It is maintained that if Indian water claims are sanctioned by Congress, then Central Arizona's population will be forced to depend entirely upon the continued and increased use of already overdrafted groundwater, and will more desperately than ever need the imported CAP water. (See also W78-04934) (Jamail-Arizona)
W78-04941

ANALYSIS OF SOME AQUATIC ENVIRONMENTS OF THE VALLEY OF KATHMANDU DURING THE MONSOON PERIOD: AUGUST-SEPTEMBER, 1971, (IN FRENCH),
Centre Univ. de Savoie, Chambery (France). Lab. de Biologie Vegetale.
For primary bibliographic entry see Field 5G.
W78-04962

INSTITUTIONAL DESIGN FOR IMPROVED ENVIRONMENTAL QUALITY: LEGAL AND ECONOMIC ASPECTS IN WISCONSIN,
Wisconsin Univ.-Madison. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W78-04971

REPORT TO THE CONGRESS ON OCEAN POLLUTION, OVERFISHING, AND OFFSHORE DEVELOPMENT.
National Oceanic and Atmospheric Administration, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-04972

QUALITY ASSURANCE RESEARCH PLAN FY 1978-82.
Environmental Protection Agency, Washington, DC. Office of Research and Development.
For primary bibliographic entry see Field 5G.
W78-05007

1975 WORLD SURVEY OF CURRENT RESEARCH AND DEVELOPMENT ON ROADS AND ROAD TRANSPORT.
International Road Federation, Washington, DC.
For primary bibliographic entry see Field 4C.
W78-05049

SYMPOSIUM ON WATER RESOURCES MANAGEMENT IN A CHANGING WORLD, INTRODUCTION: WORLD TRENDS AND NEED,
Colorado Univ., Boulder. Inst. of Behavioral Science.
G. F. White.
Natural Resources Journal, Vol. 16, No. 4, p 737-741, October 1976. 5 ref.

Descriptors: *Water management(Applied), *Water resources development, *Planning, *Water demand, *United Nations Water Conference(1977), Regional development, History, Environmental effects, Water pollution control, Water supply, Groundwater, Natural resources, International waters, Water policy.

The United Nations Water Conference during March 1977 will focus on several new aspects of water policy. The new orientation reflects a basic change in perspective regarding what constitutes integrated development in the world context, a stronger recognition of the environmental impact of water projects, deepened public concern for water pollution, and greater stress on water management in urban areas and areas sharing groundwater resources. A broader view is taken of the scope of water management, extending it from water supply to water demand, from effluent disposal to control of industrial production processes, and from flood control to flood plain planning. These concerns have replaced earlier emphases on data collection, modes of analysis, and integrated river basin development. Principal current international problems are: (1) unsuitable domestic water supplies for 20% of the urban population and 75% of the rural population; (2) increasing degradation of water quality due to waste disposal and nonpoint pollution; (3) rapid increase in complexity and volume of industrial waste discharge, including enlarged mutagenic and carcinogenic effects; (4) continued destruction of soil fertility through waterlogging, salinization, alkalinization, and erosion in agricultural areas; (5) accelerated exhaustion of groundwater supplies; (6) needlessly high cost for water use; and (7) conflicts over water rights. (Lynch-Wisconsin)
W78-05133

WATER LEGISLATION AND INSTITUTIONS--THEIR ROLE IN WATER RESOURCES DEVELOPMENT AND MANAGEMENT,
F. O. C. Hodges.
Water International, Vol 2, No 3, p 3-9, September, 1977. 13 ref.

Descriptors: *Water law, *Water rights, *Administrative agencies, Riparian rights, Prior appropriation, Irrigation, Land use, Groundwater, Surface waters, Water resources development, Institutions, Priorities.

As countries develop using their available water to an increasing extent, it is a sad fact that water resources legislation tends to lag behind the need for it. Though conditions differ greatly from country to country thus necessitating respective differences in water laws and institutions, one common factor--the best interests of the inhabitants--should be the basis for any nation's legislation. This paper provides an overview of existing systems of laws relating to water use from both surface and underground sources. Three broad categories of existing legal systems are discussed: reparian rights, prior appropriation, and administrative disposition of water-use rights. Further comments are made on the subjects of priorities for use, surface-ground water relationships, abatement of pollution, land reform, overpumping and salt water intrusion, and governmental powers in water emergencies. The paper advocates a democratic and interdisciplinary approach to worldwide water resources planning in the future. (Eberle-NWWA)
W78-05180

WATER ALLOCATION BILLS PASSED BY SOUTH DAKOTA LEGISLATURE.
From the State Capitals, Water Supply Report No 3, p 3-4, March 10, 1978.

Descriptors: *South Dakota, *Water law, *Water allocation(Policy), Legislation, Groundwater, Irrigation, Pumping, Water levels, Water table.

Increasing use of ground water for irrigation is one of the factors which has prompted the passage of new bills by the South Dakota legislature. First come, first serve policy has prevailed in the past, but declining water levels aggravated by recent drought conditions have led to a re-evaluation of priorities. Many of the bills give more control to the Water Rights Commission under the State Department of Natural Resources Development. Among the items awaiting final passage and signature are bills calling for: (1) a temporary hold on irrigation from ground water sources; (2) maintaining minimum flows in streams and restriction of ground water pumpage should rivers begin to dry up; (3) future appropriations of water to be delegated to water districts; (4) allowing water permits to be transferred between users, and; (5) monitoring of certain irrigation systems. (Eberle-NWWA)
W78-05186

6F. Nonstructural Alternatives

BIG THOMPSON FLOOD EXPOSES NEED FOR BETTER FLOOD REACTION SYSTEM TO SAVE LIVES,
Colorado Univ., Boulder. Inst. of Behavioral Science.
E. C. Gruntifest, T. E. Downing, and G. F. White.
Civil Engineering-ASCE, Vol. 48, No. 2, p 72-73, February 1978. 2 fig.

Descriptors: *Disasters, *Flash floods, *Colorado, *Hazards, Behavior, Social aspects, Attitudes, Warning systems, Flood protection, Flood forecasting, Flooding, Communication, *Big Thompson(Colo).

The actions people took in response to warnings of disaster in the Big Thompson flood of 1976 affected their chances for survival. No one who climbed the side of the canyon was killed in the flood. People who tried to escape in cars or stayed inside vulnerable buildings were less likely to survive. An effective flash flood warning system can save lives. To provide effective warnings, the system should include: early and reliable prediction and detection of the flood, careful preparedness planning, and consideration of the wording and dissemination of the warning message. An extensive public information program can inform people of the nature of the hazard and the range of alternatives in preparation for its occurrence. (Humphreys-ISWS)
W78-04852

BIG THOMPSON FLOOD DAMAGE WAS SEVERE, BUT SOME COULD HAVE BEEN PREVENTED,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
M. L. Albertson, M. Poreh, and G. A. Hurst.
Civil Engineering-ASCE, Vol. 48, No. 2, p 74-77, February 1978. 4 fig.

Descriptors: *Disasters, *Flash floods, *Colorado, *Flood damage, Floods, Flooding, Flood protection, Warning systems, Damages, Hazards, Erosion, Scour, Stream erosion, Flood plain zoning, *Big Thompson(Colo).

During the Big Thompson flood of 1976, damages resulted from impact by water and debris and from

erosion and scour. Houses were lifted from their foundations and floated away; buildings were filled with several feet of mud and debris; roadways were undermined and collapsed. Although these damages could not have been avoided completely, future damages can be reduced. Building within the flood plain should be prevented; those structures built in the flood plain should be anchored to massive foundations. Highways should be protected, either by rerouting them out of the flood zone or by constructing riprap or retaining walls to protect embankments from erosion. Equally important is a warning system that can operate even during a power and telephone failure. If such a warning system had been in existence in the Big Thompson canyon, it might have saved as many as half the lives lost, but probably would have done little to prevent damage to real property. (Humphreys-ISWS)
W78-04853

FLOOD PLAIN DWELLERS' PERCEPTION OF FLOOD HAZARD,
Alberta Univ., Edmonton. Dept. of Geography.
H. J. McPherson, and T. F. Saaringn.
Arizona Review, University of Arizona, College of Business and Public Administration, Vol 29, No 12, p 1-10, December 1977. 8 tab, 1 fig.

Descriptors: *Attitudes, *Flood plains, Flood plain zoning, Flood plain insurance, *Flood control, Flood damage, *Arizona, Social aspects, Tucson(Ariz).

Floodplain residents in Tucson are satisfied with their present location, and see no real disadvantages. A high proportion, 61%, believe that they are not in a flood danger zone and only 35% believe they would be personally affected in the event of a flood. In general, residents believe a severe flood in Tucson would be less serious than their general concept of a flood. Only a small percentage, 14.8%, intends to purchase flood insurance. The major responsibility for flood control is seen as belonging to government, and faith in technology to overcome problems is implicit in these reactions. Personal responsibilities for flood control were mentioned only 7% of the time. It is felt that these responses should be evaluated carefully in terms of future flood control implementation. (Payton-Arizona)
W78-04933

ASSESSMENT OF FLOOD AND EROSION ASSISTANCE PROGRAMS, RONDEAU COASTAL ZONE EXPERIENCE, LAKE ERIE,
Waterloo Univ. (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 4A.
W78-05037

6G. Ecologic Impact Of Water Development

IMPACT OF SOCIAL ATTITUDES ON MANAGING THE ENVIRONMENT,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W78-04724

SUMMARY REPORT 1975: FOOD PROTECTION AND TOXICOLOGY CENTER, UNIVERSITY OF CALIFORNIA, DAVIS.
California Univ., Davis. Food protection and Toxicology Center.
For primary bibliographic entry see Field 5C.
W78-04745

A PRIORITY-TRADEOFF-SCANNING APPROACH TO EVALUATION IN ENVIRONMENTAL MANAGEMENT,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6B.
W78-04795

APPLICATION OF RESIDUALS MANAGEMENT FOR ASSESSING THE IMPACTS OF ALTERNATIVE COAL-DEVELOPMENT PLANS ON REGIONAL WATER RESOURCES,
Geological Survey, Reston, VA. Water Resources Div.; and Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 6A.
W78-04879

IRRATIONAL LAND USE AND DESERTIFICATION IN RAJASTHAN DESERT,
Central Arid Zone Research Inst., Jodhpur (India).
For primary bibliographic entry see Field 4C.
W78-04924

INSTITUTIONAL DESIGN FOR IMPROVED ENVIRONMENTAL QUALITY: LEGAL AND ECONOMIC ASPECTS IN WISCONSIN,
Wisconsin Univ.-Madison. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W78-04971

DEVELOPMENT AND OPERATION OF HF OCEAN CURRENT MAPPING RADAR UNITS,
National Oceanic and Atmospheric Administration, Seattle, WA. Wave Propagation Lab.
For primary bibliographic entry see Field 2L.
W78-04974

SURFACE CURRENTS OF THE NORTHEAST CHUKCHI SEA,
Bureau of Land Management, Groton, CT.
For primary bibliographic entry see Field 5B.
W78-04975

CURRENT MEASUREMENT IN POSSIBLE DISPERSAL REGIONS OF THE BEAUFORT SEA,
Washington Univ., Seattle. Dept. of Oceanography; and Washington Univ., Seattle. Applied Physics Lab.
For primary bibliographic entry see Field 5B.
W78-04976

EFFECTS OF SEASONABILITY AND VARIABILITY OF STREAMFLOW ON NEARSHORE COASTAL AREAS,
Alaska Univ., Inst. of Water Resources.
For primary bibliographic entry see Field 4A.
W78-04977

GULF OF ALASKA STUDY OF MESOSCALE OCEANOGRAPHIC PROCESSES (GAS-MOP),
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W78-04978

NUMERICAL STUDIES OF ALASKAN REGION,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W78-04979

BRISTOL BAY OCEANOGRAPHIC PROCESSES (B-BOP),
National Oceanic and Atmospheric Administration, Boulder, CO. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W78-04980

STD MEASUREMENTS IN POSSIBLE DISPOERSAL REGIONS OF THE BEAUFORT SEA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-04981

YUKON DELTA COASTAL PROCESSES STUDY,
Houston Univ., Houston, TX. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W78-04982

LAGRANGIAN SURFACE CURRENT MEASUREMENTS ON THE OUTER CONTINENTAL SHELF,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological Labs.
For primary bibliographic entry see Field 5B.
W78-04983

STUDY OF CLIMATIC EFFECTS ON FAST ICE EXTENT AND ITS SEASONAL DECAY ALONG THE BEAUFORT-CHUKCHI COASTS,
Colorado Univ., Boulder. Inst. of Arctic and Alpine Research.
For primary bibliographic entry see Field 5B.
W78-04984

MECHANICS OF ORIGIN OF PRESSURE RIDGES, SHEAR RIDGES AND HUMMOCK FIELDS IN LANDFAST ICE,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-04985

MORPHOLOGY OF BEAUFORT, CHUKCHI AND BERING SEAS NEAR SHORE ICE CONDITIONS BY MEANS OF SATELLITE AND AERIAL REMOTE SENSING,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-04986

EXPERIMENTAL MEASUREMENTS OF SEA ICE FAILURE STRESSES NEAR GROUNDED STRUCTURES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-04987

BEAUFORT SEA, SHUKCHI SEA, AND BERING STRAIT BASELINE ICE STUDY,
Alaska Univ., College.
For primary bibliographic entry see Field 2C.
W78-04988

DEVELOPMENT OF HARDWARE AND PROCEDURES FOR IN SITU MEASUREMENT OF CREEP IN SEA ICE,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-04989

OPERATION OF AN ALASKAN FACILITY FOR APPLICATIONS OF REMOTE-SENSING DATA TO OCS STUDIES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W78-04990

CIRCULATION AND WATER MASSES IN THE GULF OF ALASKA,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 2L.
W78-04991

MARINE CLIMATOLOGY OF THE GULF OF ALASKA, THE BERING AND BEAUFORT SEAS,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center.
For primary bibliographic entry see Field 2B.
W78-04992

CLIMATIC ATLAS OF THE OUTER CONTINENTAL SHELF WATERS AND COASTAL REGIONS OF ALASKA,
Alaska Univ., Anchorage. Arctic Environmental Information and Data Center; and National Climatic Center, Ashville, NC.
For primary bibliographic entry see Field 2B.
W78-04993

NEAR-SHORE METEOROLOGY,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 2L.
W78-04994

A STUDY OF BEAUFORT SEA COASTAL EROSION NORTHERN ALASKA,
For primary bibliographic entry see Field 2J.
W78-04995

MODELING OF TIDES AND CIRCULATIONS OF THE BERING SEA,
Rand Corp., Santa Monica, CA.
For primary bibliographic entry see Field 2L.
W78-04996

COASTAL METEOROLOGY OF THE ALASKAN ARCTIC COAST,
Washington Univ., Seattle. Polar Research Center.
For primary bibliographic entry see Field 2B.
W78-04997

NORTON SOUND/CHUKCHI SEA OCEANOGRAPHIC PROCESSES (N-COP),
Washington Univ., Seattle. Dept. of Oceanography; and National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 2L.
W78-04998

HICKORY CREEK DRY RESERVOIR: A COMPROMISE DESIGN FOR BOTH FLOOD CONTROL AND NATURAL AREA PROTECTION,
Illinois State Dept. of Transportation, Springfield. Div. of Water Resources.
For primary bibliographic entry see Field 4A.
W78-05026

ECOLOGICAL COMPARISONS BETWEEN A FRESH-WATER TIDAL MARSH AND ADJOINING IMPOUNDMENT IN SOUTHEASTERN PENNSYLVANIA,
Pennsylvania State Univ., University Park. School of Forestry.
For primary bibliographic entry see Field 2L.
W78-05090

THE INFLUENCE OF SUBMERSED AQUATIC PLANTS ON TEMPERATURE GRADIENTS IN SHALLOW WATER BODIES,
Guelph Univ., (Ontario). Dept. of Botany and Genetics.
For primary bibliographic entry see Field 2H.
W78-05091

THE IMPACT OF DEVELOPMENT PROJECTS ON ESTUARINE AND OTHER WETLAND ECOSYSTEMS,
Transport and Environment Studies. London (England).
J. B. Elkington.
Environmental Conservation, Vol. 4, No. 2, p 135-144, Summer, 1977. 4 fig, 31 ref.

Descriptors: *Estuaries, *Land use, *Recreation, *Urban land use, *Agriculture, Wetlands, Water pollution effects, Polychlorinated biphenyls, Reclamation, Third World countries, Airports, Lake Nakuru(Kenya), Hudson River, Exotic flora, Lake Manzala(Egypt), Lake Hornborgasjon(Sweden), Aquaculture.

Despite various campaigns to publicize the value and plight of wetlands, pressures for development and economic growth are often such that ecological issues are obscured. The biology of the estuarine environment is discussed as a first step to evaluating the impact of pollution and land use policies. The impacts of urban, agricultural and recreational use of wetland areas are reviewed with particular reference to wetland ecosystems of Third World countries. The importance of experiment in evaluating alternative land use options (such as intensive fish farming) is stressed, and a simple model for ecologically sound development is proposed which could apply to Lake Manzala in the Arab Republic of Egypt's Northern Wetlands. (Stihler-Mass)
W78-05095

A STUDY OF THE EFFECTS OF STREAM CHANNELIZATION AND BANK STABILIZATION ON WARMWATER SPORT FISH IN IOWA. SUBPROJECT NO. 2. A STUDY OF THE IMPACT OF SELECTED BANK STABILIZATION STRUCTURES ON GAME FISH AND ASSOCIATED ORGANISMS,
Iowa Cooperative Fishery Research Unit, Ames.
A. L. Witten, and R. V. Bulkley.
Fish and Wildlife Service, Office of Biological Services Report 76/12, May, 1975. 116 p, 7 fig, 15 tab, 23 ref, 4 append.

Descriptors: *Stream improvement, Stream stabilization, *Warm-water fish, *Fish management, *Iowa, *Aquatic insects, *Habitat improvement, Streams, Streambeds, Stream erosion, Scour, Bank erosion, Retaining walls, Barriers, Jetties, Fish, Bullheads, Channel catfish, Sunfishes, Mayflies, Dragonflies, Caddisflies, Bank stabilization structures, Game fish.

Four types of stream bank stabilization structures (revetments, retards, permeable jetties, impermeable jetties) were studied to determine their impact upon game fish habitat. Permeable jetties and retards deepened the channel near the structures 7 to 110% greater than the maximum depth in control sections. No other significant differences in either physical parameters or in mean body length or abundance of game fish were found between structured and non-structured stream sections. Unusually high water during the sampling period may have allowed fish to remain dispersed throughout the streams rather than concentrating in the deep pools at or near stabilization structures. Rock revetments and impermeable jetties fostered the growth of some invertebrates, primarily mayflies and caddisflies. Revetments, which presented the most rock surface for invertebrate colonization, had the greatest impact on invertebrate abundance. A long rock jetty, extending far enough into the stream to produce a scour hole, would combine most of the advantages noted in the structures studied. For habitat improvement, rock was superior to steel as a construction material, and structures which cause the formation of scour holes superior to those that do not deepen the stream. (Steiner-Mass)
W78-05097

WETLAND INVENTORY, ONEIDA COUNTY, NEW YORK,
Oneida County Environmental Management Council, Utica, NY.
B. Gilman.
February, 1976. 69 p, 5 fig, 3 tab, 33 ref, 4 append.

Descriptors: *Wetlands, *New York, *Census, *Conservation, *Biological community, *Hydrologic aspects, *Aesthetics, Bogs, Aquatic habitats, Freshwater marshes, Data collections, Surveys, Developed waters, Preservation, Deltas, Swamps, Marshes, Attitudes, Natural resources, Psychological aspects, Water utilization, *Oneida County(NY), Biological aspects.

An inventory method was designed to record the present status of county wetlands, identifying those that are endangered by development, valuable as a natural resource, or desirable for preservation. Wetland sites observed were classified into their basic types (natural, enhanced, artificial, isolated, bog, ponded, streamside, deltaic) with three wetland values distinguished (biologic, hydrologic, potential human use). For each value, several criteria--weighted for their importance--were developed to produce a total rating. Enhanced streamside and pondside sites scored highest in biologic importance while all types scored well in human use, noticeably the ponded, streamside, and bog sites. Natural deltaic and enhanced ponded wetlands scored high in hydrologic importance, probably as a result of their ability to store large quantities of water. Only the deltaic sites scored high in all three categories. Wetlands located in the northwestern county region, where bedrock materials were conducive to groundwater recharge, scored consistently higher in hydrologic importance than those of other regions. County-wide wetland ratings in biologic and human use values did not show recognizable patterns with county physiography. Evaluation scores for those values were influenced by a variety of wetland characteristics with wetland type playing a major role. (Steiner-Mass)
W78-05099

THE VEGETATION OF BRITISH INLAND SALT MARSHES,
Manchester Univ. (England) Dept. of Botany.
For primary bibliographic entry see Field 2I.
W78-05100

IMPACT OF WATER LEVEL CHANGES ON WOODY RIPARIAN AND WETLAND COMMUNITIES. VOLUME I: PLANT AND SOIL RESPONSES TO FLOODING,
Missouri Univ.-Columbia. School of Forestry, Fisheries and Wildlife.
R. O. Teskey, and T. M. Hinckley.
Available from the Supt. of Documents, GPO, Washington, DC 20402, Price $0.00. Fish and Wildlife Service, Office of Biological Services Report 77/58, December, 1977. 30 p, 1 fig, 1 tab, 103 ref.

Descriptors: *Riparian plants, *Water level fluctuations, Documentation, *Physiological ecology, *Resistance, *Root development, Wetlands, Riparian land, Banks, Swamps, Water levels, Soil-water-plant relationships, Aeration, Moisture, Soil water, Excess water(Soils), Soil chemical processes, Publications, Data collections, Plant physiology, Environmental effects, Flood plains, Floods, Rhizosphere, Nutrients, Plant growth, Tolerance mechanisms.

A comprehensive literature review of general plant physiological responses to managed or natural changes in water levels (i.e., submersion, flooding, soil saturation) and on plant tolerance mechanisms involved in water level changes is presented. The major effect of flooding is the creation of an anaerobic environment surrounding the root system and the maintenance of proper root functioning is the factor which determines tolerance to flooding. Physical tolerance mechanisms involve

processes designed to increase oxygen content in the roots either by transport of oxygen from the stem or from parts of the root system where oxygen is more available. Metabolic mechanisms enable the plant to utilize less toxic end-products. Tolerant species are able to maintain root systems with a minimum of stress by incorporating a variety of tolerance mechanisms. Soil factors may ameliorate or accentuate the problem caused by flooding on physiological changes. Soils which are flooded show a decrease in oxygen concentration which leads to changes in soil chemistry (pH and redox potential) and nutrient availability. Five water level factors--time of year, flood frequency, duration, water depth, and siltation--are considered critical in determining a plant's physiological responses. (See W78-05102 and W78-05103) (Steiner-Mass)
W78-05101

IMPACT OF WATER LEVEL CHANGES ON WOODY RIPARIAN AND WETLAND COMMUNITIES. VOLUME II: THE SOUTHERN FOREST REGION,
Missouri Univ.-Columbia. School of Forestry, Fisheries and Wildlife.
R. O. Teskey, and T. M. Hinckley.
Available from the Supt. of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Fish and Wildlife Service, Office of Biological Services, Report 77/59, December, 1977. 46 p, 1 fig, 2 tab, 55 ref.

Descriptors: *Southeast U.S., *Trees, *Floods, *Resistance, Documentation, *Ecological distribution, *Data collections, Biological communities, Wetlands, Riparian land, Riparian plants, Swamps, Water levels, Water level fluctuations, Soil water, Excess water(Soils), Publications, Physiological ecology, Environmental effects, Flood plains, Plant growth, Deciduous trees, Succession, Forests, Mixed forests, Forest management, Southern forests(US), Ecoregions, Flood plain forest, Bluestem prairie.

A description and documentation of the natural plant ecoregions (communities) occurring in the Southern Forest region as affected by flood inundation presented. The four ecoregions described are: Southern Mixed Forest, Southern Floodplain Forest, Beech-Sweetgum-Magnolia-Pine-Oak Forest, and Bluestem Prairie. Within each ecoregion, site characteristics for dominant species are followed by lists of the associated species arranged in order of increasing site-soil moisture. In addition, the climate, soils, general physiography and bottom land successional pattern for each ecoregion is developed. A table summarizes information from existing literature regarding mature tree and seedling survival in 66 species under three water conditions: total submersion, partial submersion, and soil saturated. The information is also divided into flood periods during the growing season, the dormant season, and year-round. Associated with this table is a ranking of relative tolerance to flooding of these species. (See also W78-05101) (Steiner-Mass)
W78-05102

IMPACT OF WATER LEVEL CHANGES ON WOODY RIPARIAN AND WETLAND COMMUNITIES. VOLUME III: THE CENTRAL FOREST REGION,
Missouri Univ.-Columbia. School of Forestry, Fisheries and Wildlife.
R. O. Teskey, and T. M. Hinckley.
Available from the Supt. of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Fish and Wildlife Service, Office of Biological Services, Report 77/60, December, 1977. 36 p, 1 fig, 2 tab, 43 ref.

Descriptors: *Central U.S., *Trees, *Floods, *Resistance, Documentation, *Ecological distribution, Biological communities, Wetlands, Oak trees, Hickory trees, Riparian land, Riparian plants, Swamps, Water levels, Water level fluctuations, Soil water, Excess water(Soils), Publications, Data collections, Physiological ecology, Environmental effects, Flood plains, Plant growth, Deciduous trees, Succession, Forests, Forest management, *Central U.S. forests, Ecoregions.

A description and documentation of the natural plant ecoregions (communities) occurring in the Central Forest Region as affected by flood inundation is presented. The three ecoregions described are: Oak-Hickory Forest, Oak-Hickory Bluestem Parkland, and Oak-Bluestem Parkland. Within each ecoregion, site characteristics for dominant species are followed by lists of the associated species arranged in order of increasing site-soil moisture. In addition, the climate, soils, general physiography and bottomland succession pattern for each ecoregion is developed. A table summarizes information from existing literature regarding mature tree and seedling survival in 53 species under three water conditions: total submersion, partial submersion, and soil saturated. The information is also divided into flood periods during the growing season, the dormant season, and year-round. Associated with this table is a ranking of relative tolerance to flooding of these species. (See also W78-05101) (Steiner-Mass)
W78-05103

AN OVERVIEW OF THE EFFECT OF LAKE POWELL ON COLORADO RIVER BASIN WATER SUPPLY AND ENVIRONMENT,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
For primary bibliographic entry see Field 4A.
W78-05131

MANAGEMENT OF SCIENTIFIC COLLABORATION IN THE LAKE POWELL RESEARCH PROJECT,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
For primary bibliographic entry see Field 4A.
W78-05132

SYMPOSIUM ON WATER RESOURCES MANAGEMENT IN A CHANGING WORLD, INTRODUCTION: WORLD TRENDS AND NEED,
Colorado Univ., Boulder. Inst. of Behavioral Science.
For primary bibliographic entry see Field 6E.
W78-05133

7. RESOURCES DATA

7A. Network Design

RECOMMENDED METHODS FOR WATER DATA ACQUISITION,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-04867

PROCEEDINGS OF CONFERENCE ON ENVIRONMENTAL QUALITY SENSORS (SECOND) HELD AT NATIONAL ENVIRONMENTAL RESEARCH CENTER, LAS VEGAS, NEVADA ON OCTOBER 10-11, 1973.
National Environmental Research Center, Las Vegas, NV.
For primary bibliographic entry see Field 5A.
W78-04947

INTEGRATED REMOTE SENSING SYSTEM,
Environmental Protection Agency, Las Vegas, NV. Monitoring Operations Lab.
For primary bibliographic entry see Field 5A.
W78-04948

THE NATIONAL ENVIRONMENTAL MONITORING SYSTEM,
Magnavox Co., Fort Wayne, IN.
For primary bibliographic entry see Field 5A.
W78-04955

MEMBRANE FILTER RETENTION: A SOURCE OF ERROR IN THE 14C METHOD OF MEASURING PRIMARY PRODUCTION,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Environmental Research Branch.
For primary bibliographic entry see Field 5A.
W78-05172

7B. Data Acquisition

COMPARISON OF EFFICIENCY OF CAPTURE OF TWO ZOOPLANKTON NETS: SELECTION OF A STATISTICAL ANALYSIS MODEL AND VERIFICATION OF ITS ACCURACY, (IN ITALIAN),
Consiglio Nazionale delle Ricerche, Pavia (Italy). Lab. Genetica and Biochemica Evoluzionistica.
O. Rossi, and I. Ferrari.
Boll Pesca Piscic Idrobiol 30(1), p 57-70, 1975.

Descriptors: Model studies, *Statistical methods, Constaceans, *Sampling, *Testing, Copepod, Plankton, Rotifer, *Zooplankton nets.

The catch efficiency of 2 zooplankton nets was compared using a statistical linear additive model. The figures analyzed were drawn from 18 series of samplings carried out at 3 depth layers in Lake Mergozzo (N Italy), using 2 Clarke-Bumpus plankton samplers: one with 45 meshes/cm the other with 69 meshes/cm. The degree of agreemment between the main hypothesis of the model was tested: additivity, normality of the distribution of the dependent variable and reality of the available data. The Tukey test (non-addivity test) showed that only by transforming all data into the log 10 of the same were these 2 base conditions met. The catch efficiency of the 2 nets is not the same for the 3 main systematic groups (Rotifers, Copepods, Cladocera), but the differential efficiency of the 2 nets is substantially the same in the layers explored and in each sampling time.--Copyright 1977, Biological Abstracts, Inc.
W78-04714

THE U.S. GEOLOGICAL SURVEY AND LAND USE MAPPING,
Geological Survey, Reston, VA.
J. R. Anderson.
In: Proceedings of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada, on October 10-11, 1973. Published December 1973, Section V, p 1-16. 9 ref.

Descriptors: *Mapping, *Maps, *Land use, Remote sensing, Classification.

The increasing number and complexity of land-use conflicts indicate a need for positive planning efforts. Urbanization was absorbing about 730,000 acres/yr during the 1960's, and another 130,000 acres/yr were being transferred to transportation from other uses. Presently there is no systematic compilation of information on existing land use and its changes on a national basis. For planning at the local level, ground surveys supplemented by aerial photographs are used, or land use information is hypothesized from utility hookups data, school population or building permits. In response to the need for better land-use data, the U.S. Geological Survey issued in October 1972 'A Land Use Classification System for Use with Remote Sensor Data' (Geological Survey Circular 671). The system, which is resource- rather than people-oriented, is designed to meet the need of federal and state agencies for an up-to-date overview of land use throughout the country which is uniform

in date, scale, and categorization at the more generalized first and second levels. ERTS-1, high-altitude aircraft platforms, and the USGS Special Mapping Center at Reston, VA, are sources of remote sensing data. The USGS Land Use Data Program provides transparent overlays depicting current land use, computer-generated graphic displays (maps), computer tapes of land-use data, and statistical data on land-use patterns and changes. (Lynch-Wisconsin)
W78-04718

DETERMINATION OF WATER IN SURFACE SOILS BY ACOUSTIC METHODS,
South Dakota State Univ., Brookings. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 2G.
W78-04821

WETLAND CLASSIFICATION AND MAPPING IN WESTERN TENNESSEE,
Geological Survey, Reston, VA. Water Resources Div., and Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 4A.
W78-04863

PROCEEDINGS OF CONFERENCE ON ENVIRONMENTAL QUALITY SENSORS (SECOND) HELD AT NATIONAL ENVIRONMENTAL RESEARCH CENTER, LAS VEGAS, NEVADA ON OCTOBER 10-11, 1973.
National Environmental Research Center, Las Vegas, NV.
For primary bibliographic entry see Field 5A.
W78-04947

INTEGRATED REMOTE SENSING SYSTEM,
Environmental Protection Agency, Las Vegas, NV. Monitoring Operations Lab.
For primary bibliographic entry see Field 5A.
W78-04948

EVALUATION OF THE ZEEMAN ATOMIC SPECTROMETER,
National Environmental Research Center, Las Vegas, NV. Monitoring Systems Research and Development Lab.
E. W. Bretthauer.
In: Proceedi. ⁵s of Conference on Environmental Quality Sensors (Second) Held at National Environmental Research Center, Las Vegas, Nevada on October 10-11, 1973, published December 1973, Section I, p 44-59. 4 fig, 1 tab.

Descriptors: *Mercury, *Spectrometers, Monitoring, Instrumentation, Pollutants, Evaluation, *Pollutant identification, *Isotope Zeeman Atomic Absorption spectrometer.

The Isotope-shifted Zeeman Atomic Absorption Spectrometer (IZAA) was developed at Lawrence Berkeley Laboratory for the direct analysis of mercury in the parts/per billion range in environmental samples. This report is a preliminary evaluation of the instrument by the National Environmental Research Center, Las Vegas (NERC-Las Vegas). In the IZAA the sample is thermally decomposed and oxidized in a furnace at 900 C, whereupon the gaseous sample is swept into a heated absorption tube by a stream of oxygen. Here it is probed by a dual-constituent light beam; one constituent has a wavelength centered on the absorption profile of natural Hg in air, while the other is slightly displaced (less than one cm) from the mercury absorption line. Absorption in the first constituent is caused by Hg vapor as well as by non-Hg decomposition products. The absorption of the second constituent is due only to the nonmercury products. The difference therefore indicates the absorption due to Hg alone. The two optical lines are generated through splitting with a magnetic field (the Zeeman effect). IZAA can directly analyze most types of samples in 30 sec. Results of testing indicate acceptable reproducibility in the 0.1-5.0 ppm range, and a reasonable independence of signal from concentration (0.4-5.0 ppm) and sample size (10-50 microliters) for aqueous solutions. The signal is reasonably independent of the chemical form of mercury; however, combinations of different chemical forms of Hg in the same aqueous sample produced signals which were nonadditive. (See also W78-04947) (Lynch-Wisconsin)
W78-04949

MULTIWAVELENGTH LIDAR FOR REMOTE SENSING OF CHLOROPHYLL-A IN PHYTOPLANKTON,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-04950

SUMMARY OF NASA LANGLEY RESEARCH CENTER REMOTE SENSING ACTIVITIES UNDER THE ENVIRONMENTAL PROTECTION AGENCY INTERAGENCY AGREEMENTS: POTENTIAL FOR REGIONAL APPLICATIONS,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-04951

THE REMOTE DETECTION AND IDENTIFICATION OF SURFACE OIL SPILLS,
Spectrogram Corp., North Haven, CT.
For primary bibliographic entry see Field 5A.
W78-04952

VIDEO DETECTION OF OIL SPILLS,
National Aeronautics and Space Administration, Moffett Field, CA. Ames Research Center.
For primary bibliographic entry see Field 5A.
W78-04953

MEASUREMENTS OF THE DISTRIBUTION AND VOLUME OF SEA-SURFACE OIL SPILLS USING MULTIFREQUENCY MICROWAVE RADIOMETRY,
Hulburt (E.O.) Center for Space Research, Washington, DC. Space Science Div.
For primary bibliographic entry see Field 5A.
W78-04954

THE NATIONAL ENVIRONMENTAL MONITORING SYSTEM,
Magnavox Co., Fort Wayne, IN.
For primary bibliographic entry see Field 5A.
W78-04955

SKYLAB APPLICATION TO ENVIRONMENTAL MONITORING,
National Aeronautics and Space Administration, Houston, TX. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 5A.
W78-04956

ERTS-1 DETECTION OF ACID MINE DRAINAGE SOURCES,
Ambionics Inc., Washington, DC.
For primary bibliographic entry see Field 5A.
W78-04957

WATER QUALITY ANALYSIS USING ERTS-A DATA,
Moore School of Electrical Engineering, Pennsylvania, PA.
For primary bibliographic entry see Field 5A.
W78-04958

SATELLITE STUDIES OF TURBIDITY, WASTE DISPOSAL PLUMES AND POLLUTION-CONCENTRATING WATER BOUNDARIES,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 5A.
W78-04959

DATA COLLECTION PLATFORMS FOR ENVIRONMENTAL MONITORING,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W78-04960

LIDAR POLARIMETER MEASUREMENTS OF WATER POLLUTION,
Texas A and M Univ., College Station. Remote Sensing Center.
For primary bibliographic entry see Field 5A.
W78-04961

MORPHOLOGY OF BEAUFORT, CHUKCHI AND BERING SEAS NEAR SHORE ICE CONDITIONS BY MEANS OF SATELLITE AND AERIAL REMOTE SENSING,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-04986

DEVELOPMENT OF HARDWARE AND PROCEDURES FOR IN SITU MEASUREMENT OF CREEP IN SEA ICE,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W78-04989

OPERATION OF AN ALASKAN FACILITY FOR APPLICATIONS OF REMOTE-SENSING DATA TO OCS STUDIES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2L.
W78-04990

HYDROLOGIC DATA RELAY BY SATELLITE FROM REMOTE AREAS,
Canada Dept. of Fisheries and Environment, Ottawa (Ontario).
R. A. Halliday.
Available from the National Technical Information Service, Springfield, VA 22161 as N77-24555, Price codes: A02 in paper copy, A01 in microfiche. Report No. HC A02/MF A01, March, 1977. 21 p, 1 fig, 2 tab, 7 ref.

Descriptors: *Satellites, *Remote sensing, *Data collections, *Canada, *Hydrologic data, *LANDSAT, *Geostationary Operational Environmental Satellite(GOES), *Tiros-N, *Communications satellite, ERTS, Satellite data relay, Data collection platform, Hydrologic sensor, Hydrologic data relay, Data collection system, Geostationary equatorial satellite, Low near polar satellite, Remote areas.

LANDSAT Geostationary Operational Environmental Satellites (GOES), Tiros-N, and communications satellites are compared. Since the launch of LANDSAT-1 in 1972, experiments have been conducted using these satellite systems to collect and relay hydrologic data from remote areas of Canada. All have desirable features and some drawbacks. The potential user must evaluate each system to select the one that best meets local requirements. The satellite technology has been accurate, reliable and cost effective; further development is warranted. The program of the Water Survey of Canada is described in detail and future plans for satellite data relay are discussed. Cost analyses are included. (Seip-IPA)
W78-05005

RADARSCOPE INTERPRETATION: SEVERE THUNDERSTORMS AND TORNADOES,
Air Weather Service, Scott AFB, IL.
For primary bibliographic entry see Field 2B.
W78-05006

FINAL REPORT OF INVESTIGATION OF PEARL RIVER DATA COLLECTION SYSTEM APPLICATIONS.
Mississippi Air and Water Pollution Control Commission, Jackson.
For primary bibliographic entry see Field 7C.
W78-05008

DETECTION AND MAPPING (DAM) PACKAGE,
Lockheed Electronics Co., Inc., Houston, TX. Aerospace Systems Div.
For primary bibliographic entry see Field 7C.
W78-05009

SEA-SURFACE TEMPERATURE AND SALINITY MAPPING FROM REMOTE MICROWAVE RADIOMETRIC MEASUREMENTS OF BRIGHTNESS TEMPERATURE,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 2L.
W78-05017

LAND USE CHANGE DETECTION WITH LANDSAT-2 DATA FOR MONITORING AND PREDICTING REGIONAL WATER QUALITY DEGRADATION,
Arkansas Univ., Fayetteville. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W78-05018

SOIL MOISTURE SENSING WITH AIRCRAFT OBSERVATIONS OF THE DIURNAL RANGE OF SURFACE TEMPERATURE,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
For primary bibliographic entry see Field 2G.
W78-05027

PSEUDO-LAGRANGIAN DISPERSION ESTIMATES FROM CURRENT METERS,
Ontario Ministry of the Environment, Toronto. Water Resources Branch.
For primary bibliographic entry see Field 2H.
W78-05040

MEASUREMENTS BY GEOMAGNETIC INDUCTION OF VOLUME TRANSPORT IN A SALT MARSH DRAINAGE CHANNEL,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 2L.
W78-05094

MEASUREMENT OF WATER MOVEMENT IN REFERENCE TO BENTHIC ALGAL GROWTH,
Hawaii Univ., Honolulu. Dept. of Botany.
M. S. Doty.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 468, Price codes: A02 in paper copy, A01 in microfiche. Botanica Marina, Vol 14, p 25-32, 1971. 1 fig, 1 tab, 11 ref. AT(04-3)-235.

Descriptors: *Water movement, *Algae, *Benthic flora, *Eutrophication, Clod-cards, Plant growth, Plaster of Paris, Hawaii, Methodology, Research equipment, Instrumentation, On-site investigations, Diffusion.

A device for measuring water movement is described, as well as experiments showing positive correlation of water movement with algal growth. Small plaster of Paris blocks, formed in oblong, round-bottomed ice-cube trays, are cemented onto thin plastic cards with epoxy or contact cement. After 24 hours they are dry-weighted and the weight (generally about 30 g) entered on the card. Calibration is accomplished for each lot of these clod-cards by immersing five cards in a water sample from the area to be monitored for four days, changing the water each day. A calibration value (k), calculated from the resulting mass loss, measures the solution, dissolution, and diffusion rates of the calcium sulfate from the clods under the given conditions. Clod-cards are kept in the field for 24 hours, which exposes them to changes related to diurnal and tidal factors. They are either taped to bricks or affixed to stakes or pegs driven into mud flats or cracks in rocks. After exposure, cards are rinsed in fresh water and dry-weighted. The weight loss can be used as a clod-card index value (CV), or divided by k to obtain a diffusion index factor (DF). A correlation coefficient of 0.70 for CV to standing crop of reef algae at Honolulu, Hawaii was found. Wild values which appeared embarrassingly often in tests of the clod-cards were apparently due to loss of solid pieces, bubbles in the clods, or animal nibbling. (Lynch-Wisconsin)
W78-05106

PROBLEMS INVOLVED IN MEASURING THE SOIL THERMAL CONDUCTIVITY AND DIFFUSIVITY IN A MOIST SOIL,
Agricultural Research Organization, Bet-Dagan (Israel). Div. of Soil Physics.
For primary bibliographic entry see Field 2G.
W78-05122

REMOTE SENSING ANALYSIS OF LAKE LIVINGSTON AQUATIC PLANTS, 1975 FINAL REPORT,
Texas A and M Univ., College Station. Remote Sensing Center.
For primary bibliographic entry see Field 5A.
W78-05134

7C. Evaluation, Processing and Publication

COMPUTER MONITORING OF ENVIRONMENTAL CONDITIONS IN A WATERSHED,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4D.
W78-04733

MODELING OF ACID MINE DRAINAGE AND OTHER POLLUTANTS IN THE MONOGAHELA RIVER BASIN UNDER LOW FLOW CONDITIONS,
West Virginia Univ., Morgantown. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-04746

SYSTEMS FOR RAPID RANKING OF ENVIRONMENTAL POLLUTANTS,
Stanford Research Inst., Menlo Park, CA.
For primary bibliographic entry see Field 5A.
W78-04806

SOIL HYDRAULIC PROPERTIES DETERMINED BY INFILTRATION EXPERIMENTS AND SIMULATION,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 2G.
W78-04812

THE SMALL SAMPLE EXPECTATION OF RESCALED POPULATION AND RESCALED ADJUSTED RANGES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulics and Water Power.
For primary bibliographic entry see Field 2E.
W78-04831

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. GREAT LAKES, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
Office of Water Data Coordination Report, 1977. 125 p, 5 fig, 5 tab.

Descriptors: *Hydrologic data, *Information retrieval, *Coasts, *United States, *Great Lakes, Indexing, Streamflow, Groundwater, Surface waters, Water quality, Federal government, State governments, Local agencies, Other agencies.

The Catalog of Information on Water Data is a computerized information file about water-data-acquisition activities in the United States and its territories and possessions. The information contains input from Federal, State, and local agencies, and private organizations. The Catalog is a file about water-data-acquisition activities and not a file of the actual water data. This special report provides information about water data stations located in the coastal areas. Four separate volumes present the information respectively for the Atlantic Coast (including Puerto Rico), the Gulf Coast, the Pacific Coast (including Alaska, Hawaii, and other Pacific Islands), and the Great Lakes. This volume includes the Great Lakes. The information should be useful both in planning for additional data needs and in planning for the best use of coastal resources. (Woodard-USGS)
W78-04855

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. ATLANTIC COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
Office of Water Data Coordination report, 1977. 283 p, 5 fig, 5 tab.

Descriptors: *Hydrologic data, *Information retrieval, *Coasts, *United States, *Atlantic Ocean, *Puerto Rico, Indexing, Streamflow, Groundwater, Surface waters, Water quality, Federal government, State governments, *Atlantic Coast, Local agencies, Other agencies.

The Catalog of Information on Water Data is a computerized information file about water-data-aquisition activities in the United States and its territories and possessions. The information contains input from Federal, State, and local agencies, and private organizations. The Catalog is a file about water-data-acquisition activities and not a file of the actual water data. This special report provides information about water data stations located in the coastal areas. Four separate volumes present the information respectively for the Atlantic Coast (including Puerto Rico), the Gulf Coast, the Pacific Coast (including Alaska, Hawaii, and other Pacific Islands), and the Great Lakes. This volume includes the Atlantic Coast and Puerto Rico. The information should be useful both in planning for additional data needs and in planning for the best use of coastal resources. (Woodard-USGS)
W78-04856

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. GULF COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey Reston, VA. Water Resources Div.
Office of Water Data Coordination report, 1977. 208 p, 5 fig, 5 tab.

Descriptors: *Hydrologic data, *Information retrieval, *Coasts, *United States, *Gulf Coastal Plains, Indexing, Streamflow, Groundwater, Surface waters, Water quality, Federal government, State governments, *Gulf coast, Local agencies, Other agencies.

The Catalog of Information on Water Data is a computerized information file about water-data-acquisition activities in the United States and its territories and possessions. The information contains input from Federal, State, and local agencies, and private organizations. The Catalog is a file about water-data-acquisition activities and not a file of the actual water data. This special report provides information about water data stations located in the coastal areas. Four separate volumes present the information respectively for the Atlantic Coast (including Puerto Rico), the Gulf Coast, the Pacific Coast (including Alaska, Hawaii, and other Pacific Islands), and the Great Lakes. This volume includes the Gulf Coast. The information should be useful both in planning for additional data needs and in planning for the best use of coastal resources. (Woodard-USGS)
W78-04857

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. PACIFIC COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
Office of Water Data Coordination report, 1977. 295 p, 5 fig, 5 tab.

Descriptors: *Hydrologic data, *Information retrieval, *Coasts, *United States, *Pacific Coast region, Indexing, Streamflow, Groundwater, Surface waters, Water quality, Federal government, State governments, Local agencies, Other agencies.

The Catalog of Information on Water Data is a computerized information file about water-data-acquisition activities in the United States and its territories and possessions. The information contains input from Federal, State, and local agencies, and private organizations. The Catalog is a file about water-data-acquisition activities and not a file of the actual water data. This special report provides information about water data stations located in the coastal areas. Four separate volumes present the information respectively for the Atlantic Coast (including Puerto Rico, the Gulf Coast, the Pacific Coast (including Alaska, Hawaii, and other Pacific Islands), and the Great Lakes. This volume includes Pacific Coast, Alaska, Hawaii, and other Pacific Islands. The information should be useful both in planning for additional data needs and in planning for the best use of coastal resources. (Woodard-USGS)
W78-04858

HYDROLOGY OF LAKE PANASOFFKEE, SUMTER COUNTY, FLORIDA,
Geological Survey, Orlando, FL. Water Resources Div.
G. F. Taylor.
Water-Resources Investigations 77-88 (open-file report), 1977. 1 sheet, 7 fig, 6 ref.

Descriptors: *Florida, *Lake basins, *Hydrologic properties, *Water quality, Inflow, Discharge(Water), Artesian heads, Streamflow, Rainfall-runoff relationships, *Lake Panasoffkee(Fla), *Sumter County(Fla).

Lake Panasoffkee, in midwest Sumter County of central Florida, receives water from three creeks and discharges water through Outlet River at an average daily rate of 207 cubic feet per second. The eastern shore of the lake is marsh and wooded swamp with inflow to the lake coming from the northeast and southeast. About 15 percent of the basin contributes surface water to the lake and about 50 percent of the 420-square-mile topographic drainage basin contributes ground water to the lake. The water from the remainder of the basin either evaporates from low areas or directly recharges the Floridan aquifer for discharge outside the basin. The maximum stage on record is 44.28 feet above mean sea level and the minimum stage on record is 37.65 feet above. The lake level is partly affected by the Wysong Dam and has stabilized in recent years at about 40.95 feet above mean sea level. The quality of the water is generally good. The lake supports a favorably balanced fish population even though minor fish kills were reported in 1973 and 1974. These kills were probably the result of algal blooms. (Woodard-USGS)
W78-04859

A GUIDE FOR APPLICATION OF THE COMPUTER PROGRAM FOR THE MODIFIED EINSTEIN METHOD OF COMPUTING TOTAL SEDIMENT DISCHARGE (MODEIN),
Geological Survey, Menlo Park, CA. Water Resources Div.
D. E. Burkham, C. G. Kroll, and G. Porterfield.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 429, Price codes: A07 in paper copy, A01 in microfiche. Geological Survey Computer Contribution, Report USGS/WRD/WRI-77/004, January 1977. 138 p, 2 fig, 1 tab.

Descriptors: *Sediment transport, *Computer programs, *Sediment discharge, *Open channels, Computers, Methodology, *Modified Einstein method, *Fortran IV(G-Level).

The computer program for MODEIN (the modified Einstein method of computing total sediment discharge) is patterned after a program developed by the U.S. Bureau of Reclamation (written commun., 1969). The program is written in Fortran IV. Execution time on the IBM 370/155 computer is about 2.0 seconds for each total sediment discharge computation. Data required for the program are the same as those required for normal hand computations. (Woodard-USGS)
W78-04860

WETLAND CLASSIFICATION AND MAPPING IN WESTERN TENNESSEE,
Geological Survey, Reston, VA. Water Resources Div., and Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 4A.
W78-04863

HYDROLOGY - 1976,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2A.
W78-04864

RECOMMENDED METHODS FOR WATER DATA ACQUISITION,
Geological Survey, Reston, VA. Water Resources Div.
A. I. Johnson.
Reprint from: EOS Transactions, American Geophysical Union, Vol 57, No 10, October 1976. 2 p.

Descriptors: *Water resources, *Data collections, *Methodology, Surface waters, Groundwater, Water quality, Fluvial sediments, Federal Government, Inter-agency cooperation, *Water data acquisition.

A Federal Interagency Work Group was impaneled by the U.S. Geological Survey's Office of Water Data Acquisition to develop recommended methods for water data acquisition. Six task groups were established by the work group, each of which was assigned a specific area of concern. More than 70 scientists, representing 17 federal agencies, participated in the task groups. Their efforts resulted in the production in December 1972 of a preliminary report, 'Recommended Methods for Water Data Acquisition.' This report discussed data acquisition methodology related to surface water, groundwater, chemical and biological water quality, fluvial sediment, and automatic water quality monitors. The report does not have legal status, but it does represent a consensus among the individuals and agencies involved regarding the most appropriate methods for water data acquisition within their fields of competence. The purpose of this paper is to communicate to the tecnical community the status of this important activity related to water data acquisition methodology. (Woodard-USGS)
W78-04867

GROUND-WATER RESOURCES OF CHESTER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04869

WATER RESOURCES DATA FOR FLORIDA, WATER YEAR 1976--VOLUME 3. SOUTHWEST FLORIDA.
Geological Survey, Tallahassee, FL. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-272 898, Price codes: A99 in paper copy, A01 in microfiche. Water-Data Report FL-76-3, (two reports), July 1977. 1070 p, 16 fig, 1 tab, 48 ref.

Descriptors: *Florida, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites, *Southwest Florida.

Water resources data for the 1975 water year in southwest Florida are contained in two publications (pages 1 to 460 and pages 461 to 1070). The data consist of discharge records for 70 streams, stage-only records for 31 streams, elevations for 107 lakes, and daily water level measurements for 352 wells. Water quality data for approximately 220 surface sites and 700 wells are included; as are miscellaneous measurement and crest-stage partial records. These data represent the National Water Data System records collected by the U.S. Geological Survey and cooperating local, State and Federal agencies in Florida. (Woodard-USGS)
W78-04871

HYDROLOGIC EVALUATION OF THE ARIKAREE FORMATION NEAR LUSK, NIOBRARA AND GOSHEN COUNTIES, WYOMING,
Geological Survey, Cheyenne, WY. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-04873

A COMPARISON BETWEEN VARIOUS CRITERIA FOR THE INTERPRETATION OF

BIOLOGICAL DATA IN THE ANALYSIS OF THE QUALITY OF RUNNING WATERS,
Parma Univ. (Italy). Lab. di Ecologia.
For primary bibliographic entry see Field 5A.
W78-04901

DATA COLLECTION PLATFORMS FOR ENVIRONMENTAL MONITORING,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W78-04960

DEVELOPMENT AND OPERATION OF HF OCEAN CURRENT MAPPING RADAR UNITS,
National Oceanic and Atmospheric Administration, Seattle, WA. Wave Propagation Lab.
For primary bibliographic entry see Field 2L.
W78-04974

HYDROLOGIC DATA RELAY BY SATELLITE FROM REMOTE AREAS,
Canada Dept. of Fisheries and Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 7B.
W78-05005

FINAL REPORT OF INVESTIGATION OF PEARL RIVER DATA COLLECTION SYSTEM APPLICATIONS.
Mississippi Air and Water Pollution Control Commission, Jackson.
Available from the National Technical Information Service, Springfield, VA 22161 as N77-15472, Price codes: A03 in paper copy, A01 in microfiche. Report No. NASA-CR-150138, November 1976, 35 p, 4 fig, 3 tab, 2 append. NAS 8-31351.

Descriptors: *Data collection, *Remote sensing, *Buoys, *Floats, *Mississippi, Satellites, Data transmission, Computers, Data storage and retrieval, Hydrology, Water analysis, Water quality, Water pollution(Stream), Dissolved oxygen, Temperature, Conductivity, Hydrogen ion concentration, *Pearl River(Miss), Data collection platform, ERTS, Hydrolab.

The reliability of employing NASA developed remote sensing data collection platforms (DCP's) was demonstrated and evaluated for the monitoring of water quality of the Pearl River in Mississippi. Three DCP's were employed in the Jackson area from April 1975 to October 1976, and a fourth in the Monticello area from June 1976 to October 1976 with analytical equipment measuring pH, dissolved oxygen, temperature, and conductivity. Water quality data were received, processed and retransmitted from an ERTS satellite to the Mississippi Air and Water Pollution Control Commission via computer linkup. Routine maintenance problems resulting from limited access to buoys, rapid changes in river stage, vandalism, and worn and broken part replacement delays hampered continuous acquisition of reliable data. The three DCP's in the Jackson area provided efficient and accurate data during the fall of 1975 and early spring of 1976. It was concluded by fall of 1976 that the quantity and quality of the data did not justify the capital expenses or daily operation and maintenance costs for continued efficient operation. DCP's provide a valuable monitoring system only if there exists a reasonably stale hydraulic system skilled and available manpower, and easy access to the DCP's. Data and equipment diagrams are presented in the appendices. (Seip-IPA)
W78-05008

DETECTION AND MAPPING (DAM) PACKAGE,
Lockheed Electronics Co., Inc., Houston, TX. Aerospace Systems Div.
E. H. Schlosser, and M. L. Brown.
Available from the National Technical Information Service, Springfield, VA 22161 Vol 1: as E77-10102 General Procedure, Jun 76. 25 p, 6 fig. Vol 2a: as E77-10101 Software User Manual (Part 1), Jun 76, 76 p. Vol 2b: as E77-10102 Software User Manual (Part 2), Jun 76, 141 p, 7 append. Vol 3: Maas E77-10103 Control Network Establishment, Jun 76, 46 p, 18 fig, 2 ref, append. NAS 9-1200.

Descriptors: *Computer programs, *Remote sensing, *Satellites, *Areal, *Data collections, *Mapping, Hydrography, Topographic mapping, Land resources, Water resources, Natural resources, *Computer mapping, *LANDSAT, Software.

The DAM package is an integrated set of manual procedures, computer programs, and graphic devices designed for efficient production of precisely registered and formatted maps from digital LANDSAT multispectral scanner (MSS) data. The software can be readily implemented on any Univac 1100 series computer with standard peripheral equipment. This version of the software includes pre-defined spectral limits for use in classifying and mapping surface water. (Seip-IPA)
W78-05009

WATER-QUALITY AND RAINFALL DATA COLLECTED WITH AUTOMATED FIELD STATION, FORT MCCLELLAN, ALABAMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Mobility and Environmental Systems Lab.
For primary bibliographic entry see Field 5A.
W78-05010

SNOW MAPPING, AND LAND USE STUDIES IN SWITZERLAND,
Zurich Univ. (Switzerland). Dept of Geography.
For primary bibliographic entry see Field 2C.
W78-05012

COMPUTER-ASSISTED FURNACE ATOMIC ABSORPTION SPECTROMETRIC ANALYSIS,
Environmental Research Lab.-Duluth, MN.
For primary bibliographic entry see Field 5A.
W78-05014

SEA-SURFACE TEMPERATURE AND SALINITY MAPPING FROM REMOTE MICROWAVE RADIOMETRIC MEASUREMENTS OF BRIGHTNESS TEMPERATURE,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 2L.
W78-05017

COMPUTER PROGRAMMING FOR MAXIMUM MODELING INFORMATION TRANSFER,
Booker Associates, Inc., Lexington, KY.
For primary bibliographic entry see Field 2E.
W78-05025

LAKE ERIE BEGINNING-OF-MONTH WATER LEVELS AND MONTHLY RATES OF CHANGE OF STORAGE,
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 4A.
W78-05048

DETERMINATION OF PRIMARY PRODUCTIVITY AND COMMUNITY METABOLISM IN STREAMS AND LAKES USING DIEL OXYGEN MEASUREMENTS,
Geological Survey, Bay Saint Louis, MS. Water Resources, Div.; and National Aeronautics and Space Administration, Bay Saint Louis, MS. National Space Technology Labs.
For primary bibliographic entry see Field 5C.
W78-05119

8. ENGINEERING WORKS

8A. Structures

OPPORTUNITIES FOR LARGE SAVINGS BY ALTERING SOME INLAND WATERWAY OPERATIONS.
Comptroller General of the United States, Washington, DC.
For primary bibliographic entry see Field 6B.
W78-04799

CAP UPDATE,
Bureau of Reclamation, Phoenix, AZ. Arizona Projects Office.
For primary bibliographic entry see Field 4A.
W78-04940

THE CAP IN CONTROVERSY,
Central Arizona Project Association, Phoenix.
For primary bibliographic entry see Field 6E.
W78-04941

HICKORY CREEK DRY RESERVOIR: A COMPROMISE DESIGN FOR BOTH FLOOD CONTROL AND NATURAL AREA PROTECTION,
Illinois State Dept. of Transportation, Springfield. Div. of Water Resources.
For primary bibliographic entry see Field 4A.
W78-05026

8B. Hydraulics

PORTABLE, ADJUSTABLE FLOW-MEASURING FLUME FOR SMALL CANALS,
Agricultural Research Service, Phoenix, AZ. Water Conservation Lab.
J. A. Replogle.
Transaction of the American Society of Agricultural Engineers, Vol. 20, No. 5, p 928-933, September-October 1977. 5 fig, 5 ref, 2 append.

Descriptors: *Flumes, *Flow measurement, *Canals, Channels, Instrumentation, Hydraulics, On-site investigations, Measurement, Flow, Design, Caliper-flume.

A portable, field-site, survey flume was constructed and used to verify placement and design of permanent metering flumes. The portable system consisted of a trapezoidal throat that can be raised and lowered in a flowing field ditch to establish limits of free-flow operation and backwater effects on upstream structures. Mechanical solutions to problems of maintaining gage-zero on a movable-throated flume, stilling-well readout, and movable seals between ditch and flume, were presented. A family of concrete throat sections differing only in height of installation from the canal floor, were recommended for the permanent installations. Flows between about 0.5 cfs (0.01 cu m) and 25 cfs (0.7 cu m) can be measured with the portable system. Satisfactory operation can be achieved with less than 4-in (10-cm) head loss to the canal system. Permanent structures can be installed with high assurance that they will operate as intended, will be convenient enough to be used routinely, and will be rugged enough to remain reliable and accurate, well within the + or - 5% tolerance usually ascribed to field installations. (Lee-ISWS)
W78-04844

ANNUAL GRASSES FOR TEMPORARY PROTECTION OF EARTH SPILLWAYS,
Agricultural Research Service, Stillwater, OK.
For primary bibliographic entry see Field 4D.
W78-04845

TURBULENT DIFFUSION IN CHANNELS WITH A SURFACE COVER,
University of Science and Technology, Kumasi (Ghana), Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-04848

FLOW CHARACTERISTICS IN LOCAL SCOUR AT BRIDGE PIERS,
Auckland Univ. (New Zealand). School of Civil Engineering.
B. W. Melville, and A. J. Raudkivi.
Journal of Hydraulic Research, Vol. 15, No. 4, p 373-380, 1977. 5 fig, 4 ref.

Descriptors: *Scour, *Piers, *Laboratory tests, Flow, Distribution patterns, Erosion, Laboratory equipment, Testing procedures, Stream erosion, Turbulence, Shear stress, Velocity, Boundaries(Surfaces), Open channel flow, Channels, Data collections, Beds, Stream erosion, Bridge piers.

Results are summarized of an investigation of flow patterns, turbulence intensity distributions, and boundary shear stress distribution in the scour zone of a circular pier under clear water scour conditions. At the bottom of the scour hole, a rim, concentric with the cylinder, was observed for most of the time upstream of the cylinder. This rim was formed by the deflection upwards of the downflow in front of the cylinder where this upflow meets with the horseshoe vortex. The erosion occurs below the rim, which collapses irregularly in sand avalanches, forcing the material up the slope and into the flow. The eroded material is carried by the flow into the wake region. In the equilibrium scour the shear stresses are generally lower than in the intermediate scour hole or on the level bed, yet visually the surface appears to be at threshold condition. This indicates that the equilibrium conditions is maintained by the combined effect of the temporal mean shear stress, the weight component, and the turbulent agitation which everywhere add up to the local threshold condition for sediment transport. A comparison of the shear stress and turbulence intensity plots showed a tendency for the bed shear to be larger where the turbulence intensity is lower, and vice-versa. In the wake behind the cylinder, the turbulence spectrum was found to be broader than that of mean flow. It contained more energy at frequencies less than 10 Hz. The measurements of the vortex shedding frequency showed a variation in vertical plane. The shedding was in spanwise cells of constant frequency with discrete changes between cells. Over the depth investigated, the variation was of the order of 4%. (Humphreys-ISWS)
W78-04849

DEVELOPMENT OF MODELS FOR PREDICTION OF SHORT-TERM FATE OF DREDGED MATERIAL DISCHARGED IN THE ESTUARINE ENVIRONMENT,
Tetra Tech, Inc., Pasadena, CA.
For primary bibliographic entry see Field 5B.
W78-04854

PROGRESS REPORT TO THE ARKANSAS STATE HIGHWAY AND TRANSPORTATION COMMISSION FOR YEAR ENDING SEPTEMBER 30, 1977,
Geological Survey, Little Rock, AR. Water Resources Div.
M. S. Hines.
Open-file report 77-846, 1977. 21 p, 1 plate, 1 tab.

Descriptors: *Flood frequency, *Peak discharge, *Bridge design, *Road design, *Arkansas, Streamflow, Gaging stations, Rainfall-runoff relationships.

The Arkansas State Highway and Transportation Commission and the U.S. Geological Survey have a mutual interest in flood-frequency and open-channel hydraulics for the economic design of bridges and culverts. This report is a summary of the accomplishments of the cooperative program. Included are plans for future work and a brief description of related water-resources programs of the Geological Survey in Arkansas. Peak stages and discharges were determined for 106 sites. Drainage areas for Ouachita River and Red River basins were determined. Hydraulic analyses were made for five bridge sites. (Woodard-USGS)
W78-04868

THE ANALYSIS OF SMALL WATER DISTRIBUTION SYSTEMS,
Guam Univ., Agana. Water Resources Research Center.
S. J. Winter, and C. K. Liu.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-278 636, Price codes: A03 in paper copy, A01 in microfiche. Technical Report No 4, January 1978. 24 p, 4 fig, 2 tab, 2 append. OWRT A-006-GUAM(1). 14-34-0001-7024.

Descriptors: *Water distribution(Applied), Leakage, Rural areas, *Distribution systems, Methodology, Pipe flow, Networks, *Guam.

A method is derived for determining the flow lost per foot of pipe in situations involving pipes having leaks or illegal connections. The flow into the pipe and the pressure drop over the length of the pipe must be known. An example problem is solved. A modification of the Hardy-Cross technique of pipe network analysis is presented which accounts for flow out of the network per foot of pipe. This modification can be used to account for unintentional loss as well as outflow to consumers in situations where an accurate description of the flow is required. This situation is most likely to arise in small distribution systems where the outflow to each consumer may be a significant part of the total flow in a pipe. Two example problems are solved, the second involving an expansion of the network considered in the first.
W78-04943

NEAR-BOTTOM WATER MOTION UNDER OCEAN WAVES,
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
R. A. Grace.
Sea Grant Reprint No. UNIHI-SEAGRANT-CP-77-03, Reprinted from: Proceedings 15th Coastal Engineering Conference held Honolulu, Hawaii, July 11-17, 1976. (ASCE), Chap 139, p 2371-2386. 6 fig, 3 tab, 15 ref.

Descriptors: *Waves(Water *Foundations *Piles(Foundations), *Pipes, Offshore platforms, Baseline studies, Resources development, Underwater structures.

A two-year ocean experiment involving wave-induced forces on a test pipe mounted on the sea floor involved the measurement of various quantities other than the pipe forces per se. A pair of these involved surface wave characteristics and wave-induced water motion at the level of the pipe centerline but off to one end of the pipe. These wave-kinematics data have been combined, and the results of this work make up this paper in which the emphasis is on the deterministic approach to data interpretation. Presented are comparisons of the velocity and acceleration data with the predictions of Airy and stream function theories plus discussion of the dispersion of the field data. The primary intent of the paper is to suggest to designers of bottom-laid structures, such as pipes, how values of the peak velocity and maximum acceleration of the water motion associated with a non-breaking design wave of specified characteristics can be chosen. (NOAA)
W78-04967

A SIMPLE HYDRAULIC SIMULATOR,
Mekoroth Water Co. Ltd., Tel Aviv (Israel). Engineering Div.
E. Damelin, and U. Shamir.
Water Resources Bulletin, Vol. 14, No. 1, p 12-23, February 1978. 8 fig, 1 ref.

Descriptors: *Canals, *Mathematical models, *Hydraulic systems, Waves(Water), Dispersion, Hydrology, Channel flow, Model studies, Reservoirs, Pumping, Equations, *Surrogate model, Flow simulator, Outflow generator.

A simple simulator was constructed, calibrated, programmed, and used in management studies of a hydraulic system containing two pumping stations in series, connected by canals and reservoirs. The features of the model, its calibration, and its use were described, and comparisons between measured and computed hydraulic behavior were presented. (Lee-ISWS)
W78-05020

SHALLOW WAVE PROPAGATION IN OPEN CHANNEL FLOW,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
V. M. Ponce, and D. B. Simons.
Journal of the Hydraulics Division, Proceedings of American Society of Civil Engineers, Vol. 103, No. HY12, Proceedings Paper 13392, p 1461-1476, December 1977. 4 fig, 2 tab, 10 ref, 2 append.

Descriptors: *Open channel flow, *Canals, *Waves(Water), Celerity, Attenuation, Dynamics, Hydraulics, Shallow water, Equations, Dynamic characteristics, Kinematics, Propagation, Shallow water waves.

The propagation characteristics of various types of shallow water waves in open channel flow were calculated on the basis of linear stability theory. The celerity and attenuation functions of kinematic, diffusion, convective dynamic, dynamic, and gravity waves were derived. For the most general case, i.e., the dynamic wave model, the propagation characteristics are expressed as a function of the steady uniform flow Froude number and the dimensionless wave number of the unsteady component of the motion. For the dynamic model, the wave number spectrum is divided into three bands: (1) a gravity band corresponding to large wave number, where the wave celerity is the gravity wave celerity; (2) a kinematic band corresponding to a small wave number where the wave celerity is the kinematic wave celerity; and (3) a dynamic band corresponding to mid-spectrum values of the wave number, where the wave celerity falls between the gravity and kinematic celerity values. (Lee-ISWS)
W78-05045

IMPINGEMENT OF AXISYMMETRIC DEVELOPING JETS,
Research Council of Alberta, Edmonton. Transportation and Surface Water Engineering Div.
S. Beltaos, and N. Rajaratnam.
Journal of Hydraulic Research, Vol. 15, No. 4, p 311-326, 1977. 8 fig, 2 tab, 19 ref.

Descriptors: *Jets, *Laboratory tests, *Boundaries(Surfaces), *Flow, Transition flow, Hydraulics, Shear stress, Turbulent flow, Dimensional analysis, Equations, Analysis, Analytical techniques, Measurements, Model studies, Testing procedures, Foreign research, *Wall jets.

The impingement of turbulent jets on solid boundaries has been studied extensively in the past. It has been established that flow parameters in the impingement region are governed by the impingement height, H, and the initial kinematic momentum flux of the jet. This results from the fact that the jet can be considered as a point source of momentum whenever it is fully developed before entering the impingement region. This finding is

suspect in cases of 'small' values of H. An experimental and analytical study of developing jets, impinging on a smooth wall, was presented. Measurements of the velocity field, static pressure in excess of ambient, and wall shear stress were reported. Analysis of the results showed that impingement region flow parameters are governed by the diameter, d, and the initial jet velocity but are independent of H. The impingement region was found to extend 1.2d above the wall and 1.4d radially from the stagnation point. Semi-empirical methods for predicting the velocity field, static pressure, and wall shear stress were developed. The radial growth of the jet from the stagnation point, including the wall jet region, was analyzed. Using the quantitative relation governing the stagnation pressure as a criterion, it was proposed that values of H less than approximately 5.5d be considered as 'small', greater than about 8.3d as 'large', and the range of H from 5.5d to 8.3d being transitional. (Humphreys-ISWS)
W78-05047

DECREASE IN HARBOR MAINTENANCE DREDGING THROUGH THE USE OF PILE DIKES AND RELATED STRUCTURES TOGETHER WITH AN ANALYSIS OF ESTUARINE SEDIMENTATION PROBLEMS,
Naval Academy Annapolis, MD. Dept. of Oceanography.
J. F. Hoffman.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A030 905, Price codes: A03 in paper copy, A01 in microfiche. Report USNA-EPRD-29, June 1976. 25 p, 5 tab, 84 ref.

Descriptors: *Dredging, *Harbors, *Estuaries, Bathymetry, Oceanography, Hydrology, Piles(Foundations), Channels, Estuarine environment, Tidal waters, Sediments, *Harbor maintenance dredging, River-channel harbors, Tidal estuaries, Estuarine sediments, Spoil disposal problems.

Most harbors in the continental United States of interest to the Navy are located within estuaries. Because of the presence of freshwater as well as salt water, special sedimentation problems are created. Most estuaries are the repository for fine-grained sediments ranging from clay to fine sand in size. In the natural course of events, these sediments eventually would fill the estuary. A certain amount of sediment buildup within the estuary can be tolerated. One long-term solution is to remove the sediments by dredging and depositing them elsewhere. A system to accomplish sediment removal by means other than dredging was discussed. Part of the system was to entrap estuarine sediment by means of pile dikes to prevent the sediment from entering dredged shipping channels. The pile dikes consisted of 2 to 7 rows of clusters of concrete piles extended perpendicularly to the river bank. The rows were spaced approximately 5 ft apart, the clusters 15 to 20 ft apart. Piles were driven about 20 ft to 30 ft below the bottom of the estuary. A second part of the system was to remove periodically the accumulated sedimentary material by a back-flushing and slurry pumping system. (Roberts-ISWS)
W78-05050

NUMERICAL SOLUTION OF SAND TRANSPORT IN HYDRAULIC FRACTURING,
Halliburton Service, Duncan, OK.
A. A. Daneshy.
Journal of Petroleum Technology, Vol 30, No 1, p 132-140, January, 1978. 11 fig, 10 ref, 4 append.

Descriptors: *Hydraulic fracturing, *Propping agents, Sand transport, Numerical analysis, Drilling, Wells, Fractures(Geology), Sands, Viscosity, Settling velocity, Profiles, Equilibrium, Slurries.

Most hydraulic fracturing treatments are performed with a slurry composed of a fracturing fluid and a propping agent (sand) with a particle size ranging from 4 to 60 mesh. Determination of a proppant schedule involves consideration of fracture geometry, settling velocity of sand, and volume of the fluid pad preceding the propping agent into the fracture. In this paper, a numerical method is developed for the solution of sand transport in fractures, including such factors as fluid leakoff. The method can be used to compute sand transport with varying sand computation of pad volume for fracturing with high-viscosity fluids. Examples of sand bed profiles for different fluid viscosities are presented, as well as equations for settling velocity, hindered settling velocity, and equilibrium bed height. The paper recommends use of sand-transport profiles when considering particle transport in hydraulic fracturing. (Eberle-NWWA)
W78-05184

HOW MUCH IS ENOUGH. A MINIMUM WELL FORMULA,
National Water Well Association, Worthington, OH.
J. A. Hunt.
Water Well Journal, Vol. 32, No. 2, p 53-55, February, 1978.

Descriptors: *Well regulations, *Water demand, *Water yield, Well permits, Water supply, Water wells, Drawdown, Pumping, Storage tanks.

In some low-yield areas of the United States, demands by FHA and other lending institutions that a domestic well yield 5 or more gallons per minute may be unreasonable. Since FHA has set no guidelines for pumping tests, the Connecticut Well Drillers Association developed an accurate standard for acceptable and safe minimum well requirements. The formula which considers such factors as well storage, well flow, peak load, and peak load time has been in use now for over ten years. The formula requires a well to supply the maximum amount of water needed within the shortest period it is used. This demand is satisfied when well flow multiplied by peak load time is added to well storage to obtain the peak load. Well storage is thus the key concept of the formula. When well storage exceeds peak load, well flow must only be sufficient to replace well storage between peak periods. Well storage is determined by well diameter, depth of pump placement, and height of water in the well. The peak load can be determined by multiplying the number of bedrooms by 100 gallons. Peak load time is determined by dividing peak load by 3 gallons per minute multiplied by the number of bathrooms. Practical examples for calculating the water yield necessary for specific situations are given. (Palmer-NWWA)
W78-05190

CASING STORAGE CAN AFFECT PUMPING TEST DATA,
Universal Oil Products, St. Paul, MN. Johnson Div.
D. C. Schafer.
Johnson Drillers Journal, Vol. 50, No. 1, p 1-5+, January-February, 1978. 10 fig, 1 tab, 6 ref.

Descriptors: *Pumping tests, *Well casings, *Transmissivity, Theis equation, Equations, Drawdown, Aquifers, Storage.

The modified non-equilibrium formula of Jacob derived from the Theis equation is often used by hydrologists to compute aquifer characteristics from pumping tests. A basic assumption made in deriving these equations is that all water pumped during a test comes from the aquifer and none from storage in the well. This condition is not fulfilled in practice. The Papadopulos-Cooper equation developed in 1967 does take casing storage into account, thus permitting more realistic interpretation of data from early phases of pumping tests. There is a certain point in time during such tests when casing storage effects become negligible and the 'correct' slope of the time-drawdown slope appears. This value can be computed using a formula developed by Papadopulous and Cooper and further refined by Ramey. (Eberle-NWWA)
W78-05193

REGIONAL GEOLOGY SERIES: PART 2, HIGH PLAINS GROUND WATER REGION,
National Water Well Association, Worthington, OH.
For primary bibliographic entry see Field 2F.
W78-05199

8C. Hydraulic Machinery

A SIMPLE HYDRAULIC SIMULATOR,
Mekoroth Water Co. Ltd., Tel Aviv (Israel). Engineering Div.
For primary bibliographic entry see Field 8B.
W78-05020

CONTINUOUS CHAIN DRILL BIT ADVANCES THROUGH LAB TESTS,
Sandia Labs., Alburquerque, NM.
M. M. Newsom.
Oil and Gas Journal, Vol 76, No 5, p 151-160, January 30, 1978. 8 fig.

Descriptors: *Drill bits, *Drilling equipment, *Rotary drilling, Economics, Costs, Laboratory tests.

Laboratory tests indicate a down-hole changeable bit design is a structural and economic success. This continuous-chain bit contains 16 cutting surfaces that can be changed without making a trip. To cycle new cutters into place, the bit is pulled off bottom and the mud pumps are turned off. The drop of hydraulic pressure at the bit allows a spring, piston, and pawl mechanism to activate. When mud pumps are restarted, five new chain links advance to cutting position. The cutting surfaces themselves utilize a combination of natural diamonds and GE Stratapax synthetic diamonds. Comparisons with conventional diamond bits in laboratory testing show the continuous-chain design to have the superior rate of penetration. Some difficulty with the cycling mechanism did occur, but this problem will be corrected before field tests begin. Based on the results of experimentation to date, the economics of this system are sound, and substantial per-foot drilling cost savings are anticipated with its commercial use. (Eberle-NWWA)
W78-05181

CALCULATING AIR VOLUME NEEDED FOR AIR LIFT PUMPING,
Corner S. A., Sao Paulo (Brazil).
H. Basano, Jr.
Johnson Drillers Journal, Vol 49, No 6, p 9-10, November-December, 1977, 2 fig.

Descriptors: *Pumping, *Air compressors, *Air-lift pumping, Water wells, Equations, Brazil.

Although most production wells in Brazil are pumped with line-shaft turbines or submersible pumps, many wells are still being operated by the air-lift system. Some factors accounting for the use of air-lift are: (1) presence of sand or other solids in the well water which could damage a turbine; (2) need for aeration of the water, and; (3) availability of compressed air service in factories where air can be used for pumping when not needed for other uses. Many drilling contractors also develop wells and run pumping tests by using engine-driven air compressors in certain situations. To make it easier to select an air compressor of appropriate capacity for pumping situations,

this article presents a modification of the Rix and Abrams equation which relates air flow required for pumping to total lift and submergence of the air pipe. By rearranging the terms in the equation, it can be shown that the relationship between air flow required to lift one gallon per minute or one cubic meter per hour from a given depths is a straight line for any given percentage of submergence of the air pipe. (Eberle-NWWA)
W78-05182

REPLACING A SUBMERSIBLE PUMP,
W. C. Kunst.
Water Well Journal, Vol 32, No 3, p 65-67, March, 1978.

Descriptors: *Submersible pumps, *Pumps, Water wells, Failures, Equipment, Installation, Inspection, Aquifers, Well casings.

Submersible pump replacements occur for three basic reasons: (1) the former unit has failed; (2) more water is desired; or (3) the owner wishes to replace a jet or cylinder system with a submersible. The proportion of submersible pump failures resulting from manufacturing faults is small. Thorough examination of a water system before the pump is replaced usually will indicate external causes of pump failure such as lightning, sand pumping, or incrustation. Inspection of bearing and impellers from the old pump offers further clues to abrasion or cavitation problems. Pump replacement in gravel aquifers, especially in cases where higher water capacities are desired, must be undertaken with caution in order to avoid inducing sand pumping in a formerly stable well. Visual inspection of a well to static water level, plumbing in a formerly stable well. Visual inspection of a well to a static water level, plumbing its depth and straightness, determining casing depth, and test pumping are all recommended procedures for insuring that a submersible replacement installation provides safe and adequate water delivery to the well owner. (Eberle-NWWA)
W78-05185

INSTALLING A REBUILT SUBMERSIBLE MOTOR,
Magney Electric Motors, Inc. Chandler, AZ.
H. C. Magney.
Water Well Journal, Vol 32, No 3, p 60-61, March, 1978.

Descriptors: *Submersible pumps, *Pumps, Electric motors, Water wells, Electric cables, Voltage, Storage, Installation.

Even the best rebuilt submersible pump motor can be ruined by careless handling and/or improper installation. Proper care begins with receipt of the product; the motor should be checked for damage, and the voltage, speed and horsepower should be correct for the intended application. Storage procedure is crucial as well. Motors should always be stored in an upright position if kept for more than a few days, and should be left crated when possible. During installation, the motor-to-pump coupling should be a proper fit, and proper alignment between motor and pump parts must be correct. Finally, cable selection and handling should be considered one of the most important points of any submersible installation. This article as a whole presents detailed advice on equipment and procedure relating to all the aforementioned topics. (Eberle-NWWA)
W78-05187

PROVINCIAL DRILLING METHODS IN BANGLADESH: PART III,
National Water Well Association, Worthington, OH.
J. A. Hunt.
Water Well Journal, Vol. 32, No. 2, p 57-59, February, 1978.

Descriptors: *Water wells, *Bangladesh, Well casings, Well screens, Well filters, Shallow wells, Pumping, Jets, Surging, Circulation.

This report, which describes a Bangladesh drilling program sponsored by the Joint Christian Catholic Irrigation Project and directed by Chief Driller Bruce Eaton, examines various methods used to establish low-cost tubewells in Bangladesh. Many wells were developed either by bailing or by air-lift pumping the well intermittently. Because the water table is high, the backwashing effects were negligible, but the method is commonly used because of its simplicity and the availability of air compressors. Isolated wells were developed by overpumping with propeller pumps. Often, however, these pumps were damaged if the formation contained fine or abrasive sands, so this method is not recommended. Inadequately developed wells were redeveloped by high velocity jetting, which can be adapted for hand-pump use in tubewells. The method is very successful and is recommended for similar conditions because the equipment is simple and highly portable. Bamboo filters wrapped with rope and casing of bamboo wrapped with oil-coated burlap proved unsatisfactory. Screens were successfully fabricated from longitudinally slotted bamboo. These filters can be locally manufactured quickly and inexpensively using locally available materials and a circular saw with small blades. (Palmer-NWWA)
W78-05188

WHIRRING WINDMILLS PROMISE POWER,
R. Larsen.
Irrigation Age, Vol. 12, No. 5, p 46-47+, February, 1978.

Descriptors: *Windmills, *Electric power production, Wind velocity, Irrigation wells, Turbines, Turbine blades, Rotors, Pumps.

Wind turbines are being developed for rural power applications in the 10 to 200 kW power range. A wind turbine having a radius of 11.3 meters at the middle and standing 16.8 m high produces a power rating of 40 kW at 11.2 m/sec wind speeds at a test facility of the USDA Southwest Great Plains Research Center at Bushland, Texas. The turbine delivers power through an 18:1 speed increaser, a right-angle drive, and an over-running clutch to a vertical turbine pump. A wind-speed sensor controls the starter motor and brake, while an electric motor supplements wind power. The system can pump approximately 47 liters/second against a total dynamic head of 80 meters. DOE maintains a similar test facility at Rocky Flats, Col., in which a turbine mounted on a 40-foot tower and having a 3-blade, 12-foot rotor produces a power rating of 2000 Watts at a wind speed of 25 mph. A second facility, in the contract stage, will house a 2.5 megawatt electrical generating system. The system, which will have a 300-foot rotor, is designed for a site having a mean annual wind speed of 14 mph. It will eclipse General Electric's Boone, North Carolina facility, which currently generates 2 megawatts of power at 24 mph wind speeds. Energy officials feel that wind power may offer an economical alternative energy resource if system costs can be reduced and storage battery problems can be solved. (Palmer-NWWA)
W78-05189

POSSIBLE ENERGY SAVINGS IN IRRIGATION,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4B.
W78-05191

KELLY VALVE CUTS WASTE OF TIME AND MUD,
Drilco, Morgan City, LA.
S. Wooley.
Oil and Gas Journal, Vol. 76, No. 8, p 115-116, February 20, 1978. 3 fig.

Descriptors: *Drilling equipment, *Drilling fluids, *Valves, Kellys, Mud, Costs, Safety, Wells.

An automatic drill Kelly valve has been developed which can be used to improve rotary drilling economics by increasing on-bottom time and saving costly drilling fluids. The valve is attached just below the kelly and automatically closes when mud pumps are shut off, thereby saving mud that would otherwise be spilled. At least 30 seconds of crew time is saved for each drill string joint made, since waiting for the kelly to drain becomes unnecessary. Other benefits of using the kelly valve include: (1) added safety around the rotary table due to cleanliness; (2) less pollution around the rig; (3) less chance of stuck pipe during connections, since pumps are off for shorter periods; (4) in dry areas, lower drill water and cleanup water requirements. (Eberle-NWWA)
W78-05192

SEPIOLITE MUDS USED FOR HOT WELLS, DEEP DRILLING,
Dresser Industries Inc., Houston, TX. Magcobar Div.
For primary bibliographic entry see Field 8G.
W78-05194

GROUND WATER 'FLOOD' POSSIBLE IN DOWNTOWN LOUISVILLE, KENTUCKY.
For primary bibliographic entry see Field 4A.
W78-05196

GROUND WATER HEAT PUMPS,
R. Gannon.
Water Well Journal, Vol 32, No 3, p 54-58, March, 1978. 2 fig, 1 tab. Reprinted from Popular Science, February, 1978.

Descriptors: *Groundwater heat pumps, *Heat pumps, Energy, Groundwater, Heating, Cooling, Temperature, Costs, Scaling, Corrosion.

Most homeowners know at least something about conventional heat pumps, the air-to-air or air-source models. Although air-source heat pumps have the potential for very high heating and cooling efficiency under favorable conditions, efficiency plummets when the sources air dips below freezing during the heating cycle or rises into the 90's during the cooling cycle. Unlike air or surface water, ground water has a stable temperature corresponding to the mean annual temperature of the overlying air, making groundwater air ideal heat source or heat sink. Although the idea of the ground water heat pump is not new, several factors have slowed its adoption by developers and homeowners: (1) the need for a well; (2) high initial costs; (3) fear and prejudice on the part of the public against using 'unseen' ground water resources; (4) manufacturers are not promoting this new idea, are concentrating instead on conventional well-established, high business volume systems; (5) potential problems with scaling and corrosion due to ground water quality problems—it is suggested that proper design can eliminate most of such difficulties, however. (Eberle-NWWA)
W78-05197

SUN SHINES ON A NEW IRRIGATION PROJECT.
For primary bibliographic entry see Field 3F.
W78-05198

8D. Soil Mechanics

MOBILE CONTROLS FOR WATER RESOURCES PROJECTS,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
S. P. Chee.
Water Resources Bulletin, Vol. 14, No. 1, p 99-108, February 1978. 3 fig, 4 tab, 6 ref.

Descriptors: *Dams, *Earth dams, *Erosion, *Flood control, Model studies, Hydraulic models, Sediment transport, Structures, Control structures, Hydraulic structures, Floods, Design, Washouts, Embankments, *Erodible dams, Fuse plugs, Breaching.

An investigation of the erosion mechanics and washout time rates of erodible control embankments was made with hydraulic scale models in the laboratory. The water control dams have both homogeneous and clay cores. A wide range of configurations and layouts were tested, and equations were developed to make possible the computation of erosion rates. Model scale relationships were analyzed from the developed equations and compared with the results obtained analytically from sediment transport equations. (Sims-ISWS)
W78-05024

LIME TREATMENT OF DAMS CONSTRUCTED WITH DISPERSIVE CLAY SOILS,
Soil Conservation Service, Grenada, MS.
J. P. Perry.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 6, p 1093-1099, November-December 1977. 7 fig, 2 tab, 6 ref.

Descriptors: *Earth dams, *Repairing, *Erosion control, *Mississippi, Soil tests, Soil properties, Testing procedures, Lime, Soils, Clays, Erosion, Soil erosion, Slopes, Costs, On-site investigations, *Dispersive clays, *Bluff Hills Region(Miss).

Reported herein was a description of the existence and performance of dispersed clay soil in earth embankment dams and the construction requirements and experience in the use of lime in the treatment of such clay soil. The addition of lime to a dispersive soil converts the soil to a nondispersive state immediately. The modified hydrometer (turbidity) test is the most reliable field test for quality control of lime-soil construction for the Bluff Hills. The addition of lime changes Proctor's moisture-density relationship. Optimum moisture is increased by about 2 to 3 percentage points, and the plasticity index is reduced with curing. The laboratory pinhole test is the most reliable measure of erosiveness and future performance of the earth structure. The writer suggested that the air-water permeability ratio test (Agriculture Handbook No. 60) would correlate well with the pinhole test. Research is needed to determine the amount of effective clay, expressed as a fraction of the total soil matrix, to provide a non-erosive structure. Dispersive soils can be used to backfill around principal spillway pipes or other structures traversing a dam laterally. (Humphreys-ISWS)
W78-05035

8G. Materials

CONTINUOUS CHAIN DRILL BIT ADVANCES THROUGH LAB TESTS,
Sandia Labs., Alburquerque, NM.
For primary bibliographic entry see Field 8C.
W78-05181

CALCULATING AIR VOLUME NEEDED FOR AIR LIFT PUMPING,
Corner S. A., Sao Paulo (Brazil).
For primary bibliographic entry see Field 8C.
W78-05182

RESULTS OF INTERFERENCE TESTS FROM TWO GEOTHERMAL RESERVOIRS,
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 4B.
W78-05183

REPLACING A SUBMERSIBLE PUMP,
For primary bibliographic entry see Field 8C.
W78-05185

INSTALLING A REBUILT SUBMERSIBLE MOTOR,
Magney Electric Motors, Inc. Chandler, AZ.
For primary bibliographic entry see Field 8C.
W78-05187

PROVINCIAL DRILLING METHODS IN BANGLADESH: PART III,
National Water Well Association, Worthington, OH.
For primary bibliographic entry see Field 8C.
W78-05188

KELLY VALVE CUTS WASTE OF TIME AND MUD,
Drilco, Morgan City, LA.
For primary bibliographic entry see Field 8C.
W78-05192

CASING STORAGE CAN AFFECT PUMPING TEST DATA,
Universal Oil Products, St. Paul, MN. Johnson Div.
For primary bibliographic entry see Field 8B.
W78-05193

SEPIOLITE MUDS USED FOR HOT WELLS, DEEP DRILLING,
Dresser Industries Inc., Houston, TX. Magcobar Div.
J. K. Bannerman, and N. Davis.
Oil and Gas Journal, Vol. 76, No. 9, p 144-150, February 27, 1978. 3 fig, 12 tab.

Descriptors: *Drilling fluids, *Geothermal wells, *Sepiolite, Clay minerals, Rotary drilling, Mud, Viscosity, Bentonite.

An increasing number of drilling mud systems are using sepiolite clay for temperature stability, fluid loss control, viscosity control, and environmental compatability. Sepiolite is a fibrous, magnesium-rich clay mineral; while similar to attapulgite in structure, it is characterized by wider lath-shaped particles and fewer isomorphous substitutions within the lattice. These laths can associate in 'haystack' bundles to provide a thixotropic gel rather than the typical 'house of cards' association found in layered swelling clays. Sepiolite retains its reversible gel-forming ability even after high temperature static heat aging. Because of their unique properties, sepiolite muds offere distinct advantages over bentonite systems for geothermal well drilling where bottom-hole temperatures usually exceed 360 degrees F. Data from 10 wells in California's Imperial Valley show better control of circulation loss and reduction of mud costs by substituting sepiolite for bentonite as the primary viscosifier in the drilling fluid system. (Eberle-NWWA)
W78-05194

GROUND WATER HEAT PUMPS,
For primary bibliographic entry see Field 8C.
W78-05197

8I. Fisheries Engineering

MANAGEMENT EVALUATION OF STOCKED NORTHERN PIKE IN COLORADO'S SMALL PLAINS RESERVOIRS,
Colorado State Univ., Fort Collins. Dept. of Fishery and Wildlife Biology.
For primary bibliographic entry see Field 6B.
W78-04803

SURVEY OF FISHES, MAMMALS AND HERPETOFAUNA OF THE COLORADO RIVER IN GRAND CANYON,
Mississippi State Univ., Mississippi State.
For primary bibliographic entry see Field 2E.
W78-05001

HUDSON RIVER ECOSYSTEM STUDIES - EFFECTS OF ENTRAINMENT BY THE INDIAN POINT POWER PLANT ON BIOTA IN THE HUDSON RIVER ESTUARY.
New York Univ. Medical Center, NY.
For primary bibliographic entry see Field 5C.
W78-05089

A STUDY OF THE EFFECTS OF STREAM CHANNELIZATION AND BANK STABILIZATION ON WARMWATER SPORT FISH IN IOWA. SUBPROJECT NO. 2. A STUDY OF THE IMPACT OF SELECTED BANK STABILIZATION STRUCTURES ON GAME FISH AND ASSOCIATED ORGANISMS,
Iowa Cooperative Fishery Research Unit, Ames.
For primary bibliographic entry see Field 06G.
W78-05097

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

WATER QUALITY EFFECTS OF POTENTIAL URBAN BEST MANAGEMENT PRACTICES: A LITERATURE REVIEW,
Wisconsin Dept. of Natural Resources, Madison. Bureau of Water Quality.
For primary bibliographic entry see Field 05G.
W78-04744

10D. Specialized Information Center Services

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. GREAT LAKES, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 07C.
W78-04855

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. ATLANTIC COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 07C.
W78-04856

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. GULF COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 07C.
W78-04857

CATALOG OF INFORMATION ON WATER DATA, INDEX TO STATIONS IN COASTAL AREAS. PACIFIC COAST, PART A-STREAMFLOW AND STAGE; PART B-QUALITY OF SURFACE WATER; PART C-QUALITY OF GROUND WATER.
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 07C.
W78-04858

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